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REPORT

OF THE

AGRICULTURAL COMMISSIONER

MAINE 1907

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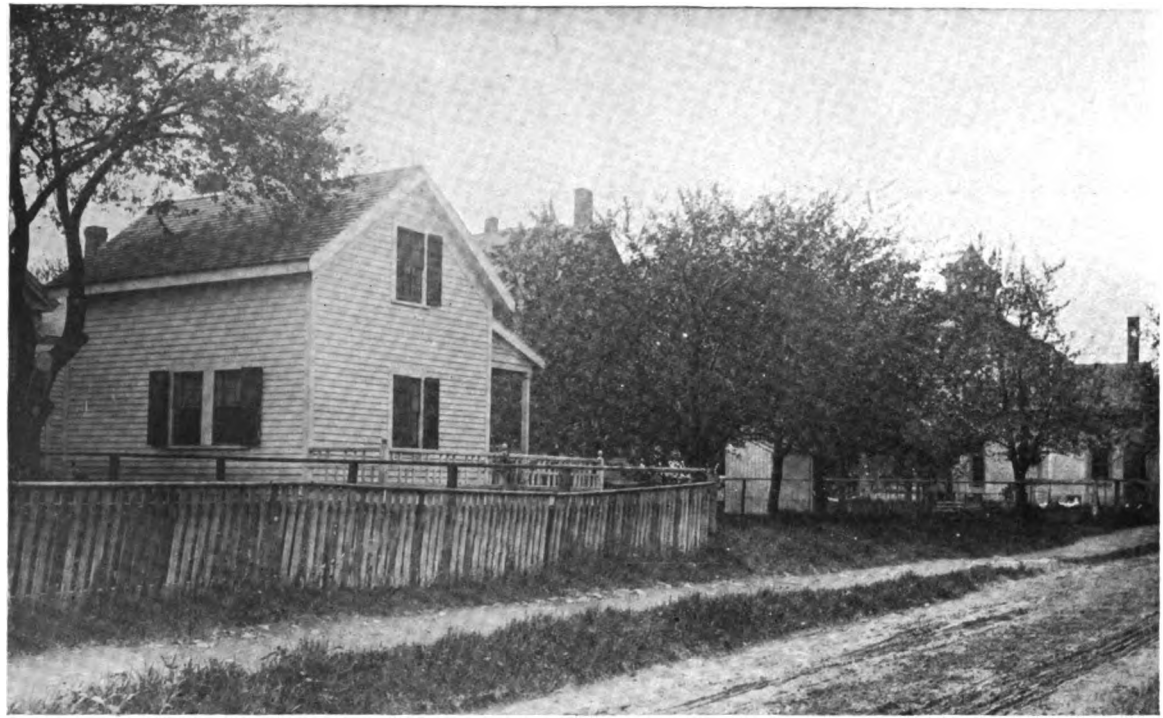
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MAINE FARMER PRESS, AUGUSTA

House on Newmarch Street, Kittery, Maine
It was here the first egg-cluster of the Gipsy Moth was found in the State, November 20th, 1906
(Frontispiece)

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AGRICULTURE OF MAINE.

SIXTH ANNUAL REPORT

OF THE

COMMISSIONER OF AGRICULTURE

OF THE

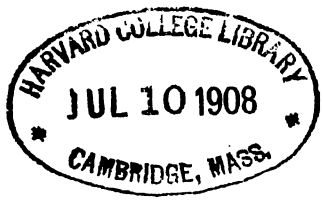
STATE OF MAINE.

1907.

WATERVILLE
SENTINEL PUBLISHING COMPANY
1908

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DEPARTMENT OF AGRICULTURE.

To the Honorable Governor and Executive Council of Maine:

In compliance with chapter 204 of the Public Laws of 1901, I herewith submit my sixth annual report as Commissioner of Agriculture of the State of Maine, for the year 1907.

A. W. GILMAN, *Commissioner.*

Augusta, January 1, 1908.

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ANNUAL REPORT OF THE COMMISSIONER OF AGRICULTURE.

The work of the Department of Agriculture during the past year has been conducted along practically the same lines as during the preceding year. We are able to report a good degree of progress among the farmers of the State, especially in the direction of more efficient farm management and the applying of business principles to the operations of the farm. Improved methods in agriculture are steadily gaining ground. Although farmers in some sections of the State have been confronted with adverse conditions during the year and quite heavy losses have been sustained, on the whole the year has been a fairly prosperous one, and they are facing the future with good courage.

We have endeavored to stimulate the farmers to increase the productive capacity of their acres by a more intelligent system of crop rotation and better methods of handling the soil. There are many acres of tillable land in our State which might be made to produce economically much larger crops than they are producing at present. With the increase in population and in the consumption of farm products there is a greater demand upon the soil, and the need of more intensive farming becomes apparent.

FARM CROPS.

The products of the farm during the past year as a whole have been of average quantity and quality, and in most instances good prices have been received. Although frequent rains interfered seriously with the harvesting of the hay crop in some sections, particularly in the northern part of the State, the yield was generally large, and a good crop was secured. There was also a good crop of small grains, the number of bushels raised

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exceeding that of 1906. The yield of potatoes was considerably less than in the preceding year. The crop in Aroostook county was injured somewhat by the excessively wet weather during the season. This invited blight and rust, and the conditions were such that on many of the wet pieces much less cultivation and spraying was done than would have been done otherwise, consequently the rot was largely increased. The first frosts were also very early and severe, and in some instances where harvesting had been delayed on account of the rains, quite a per cent of the potatoes were lost from freezing. Farmers, however, are not suffering so much from this shortage as would be the case if the price was correspondingly low. Potatoes began to sell at a good price at digging time and steadily advanced until the close of the year, when they were selling at 60 cents a bushel, with a prospect of going much higher.

A great deal of uncertainty prevailed during the entire season in relation to the apple crop. In some sections orchards suffered severely from winter-killing during the winter of 1906-7. Trees that were uninjured as a rule bore a heavy crop, but apples were late and the cold, wet weather in the fall prevented them from completing their growth and coloring up until very late. At the proper gathering time many of them were not fully mature, and in many instances help was so scarce that harvesting was delayed, and the apples suffered, as well as the potatoes, from the early frosts. Those who gathered their apples at the usual harvesting time received a larger crop than they expected and apples that were put on to the market early brought a high price.

The discovery of several infestations of the gipsy moth in the southern part of the State early in the year was the cause of much alarm. In the face of this serious menace to our orchards and forests the legislature of 1907 increased the appropriation for the suppression of insect pests to $30,000, for each of the years 1907 and 1908. With this amount, and the aid received from the National Government, very effective work has been done in the control and extermination of the gipsy and brown-tail moths, which is fully reported by the State Entomologist in this volume. Although we realize something of the magnitude of the undertaking, we are confident that if the work can be continued, by vigilant and persistent efforts these pests may be kept

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under control, and immeasurable injuries to our fruit, shade and forest trees be prevented.

Many inquiries are received at the office for statistics in relation to the agricultural products of the State. In a large number of states statistics along these lines are compiled by the agricultural departments and are of much value. If the legislature of our State should see fit to provide funds for some work of this nature, we believe it would be of much benefit to our agriculture.

DAIRY AND LIVE STOCK INTERESTS.

We are pleased to note an advance along dairy lines. The dairyman has been confronted with a serious proposition in the increased price of grain, but prices for dairy products have ruled high, and the up-to-date dairyman, by careful feeding and attention to details, has been able to secure good returns. The high prices of grain emphasize the necessity for a more thorough study of economy in production, in all lines, including a better selection of cows for the dairy and the raising of more home grown feed. Through the efforts of the State Dairy Instructor, the farmers are awakening to the importance of a more accurate knowledge of the productive capacity of their individual animals. Efforts are being made to organize cow test associations, which will enable the farmer to obtain a record of the annual production of each cow, cost of feeding, etc. Two of these associations will undoubtedly be established in the near future, and we hope that many more will follow. It is our opinion that this movement will mean much to the dairymen of the State. The report of the State Dairy Instructor will give more in detail the work in these lines.

The State Dairy Conference held at Auburn in December was one of the most interesting sessions held in recent years. The audience was large and appreciative and many matters of much importance to the dairy industry were discussed. The quality of the dairy products on exhibition was very gratifying.

Although the reports of the local assessors to the State Board of Assessors show a decrease in the number of two-year-old and three-year-old heifers in the State, this does not mean a decline in the dairy industry. It shows that farmers have been striving to increase the quality of their cows. The high price of grain,

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and the exceedingly high prices at which veal calves have been selling, have induced farmers to sell their inferior stock and make an effort to keep only that kind of stock from which they will receive a profit. Fluctuations in the numbers of dairy cattle to be found upon the farms will necessarily occur, but these have no special significance as far as the development of the dairy industry is concerned.

We trust that the increase in the number of sheep reported is an indication that the tide has finally turned and that our farmers are beginning to realize their opportunities in this direction. We are hopeful that this industry will be an increasing source of revenue to the farmer.

FARMER'S INSTITUTES.

The interest in the farmers' institute work has been unabated. Numerous requests for these meetings have been received, and reports of practical benefit derived from them by farmers, which have come to us, are very encouraging. Although the work has been carried on along the same lines as in past years, and of necessity much of the same ground has been covered, we feel that these institutes afford a necessary stimulus to the farmer, keeping him from the natural tendency to fall into ruts, and inciting thought and inquiry, as well as imparting instruction in relation to improved methods and the results of the latest investigations in agricultural lines. We believe the farmers' institute is no small factor in the agricultural education of the people. These meetings were organized to meet the demand on the part of the farming people for information, and they are now held in all the states of the Union except two, and have a potent influence on the agriculture of the country.

Forty-seven institutes have been held during the last year, with a total attendance of 6,446. The number held in each county was as follows: Androscoggin county, 3; Aroostook county, 4; Cumberland county, 3; Franklin county, 4; Hancock county, 3; Kennebec county, 2; Knox county, 3; Lincoln county, 3; Oxford county, 3; Penobscot county, 4; Piscataquis county, 2; Sagadahoc county, 2; Somerset county, 3; Waldo county, 2; Washington county, 3; York county, 3.

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Among the speakers who have assisted us at these institutes are Dr. Henry D. Holton, Brattleboro, Vt., Mr. E. D. Howe, Marlboro, Mass., Mr. Andrew Elliott, Galt, Ontario, Prof. F. W. Card, Sylvania, Pa., Prof. C. L. Beach, Burlington, Vt., and Mr. Philip H. Smith, Amherst, Mass. With these men have been associated some of the specialists and successful farmers of our State. The topics discussed have covered a wide range of agricultural work. The discussions following the addresses have shown that the interest is well maintained, and that the people are anxious for information on the subjects treated.

We have received during the past year constantly increasing requests from granges for the Department of Agriculture to furnish a speaker to discuss agricultural topics at some of their meetings. When practicable we have complied with these requests, to a limited extent, believing that this is a valuable method of carrying instruction to the farmers of the State.

AGRICULTURAL SOCIETIES.

The agricultural exhibitions held by the different societies throughout the State met with a fair degree of success. For the most part the weather was favorable, the attendance large and the interest manifested in the exhibition of stock and agricultural products was good. The stock exhibited was of a higher order than usual, more thoroughbred and registered cattle and horses being shown. Although it is said that the ox has practically left the State, there was the best exhibit of teams of oxen at the State Fairs this year that we have seen for many years.

While in some of the exhibitions the original purpose of a fair to educate the people in agriculture, seems to be somewhat obscured, it is our opinion that in a goodly number of these fairs the managers have the agricultural interests of the community at heart, and are endeavoring to add some new educational feature each year. The fair with a large agricultural exhibition, in which the educational features are prominent, good management, and a clean program will be the most successful, both financially and educationally. Maine leads the New England States in the number of fairs held, and she must maintain a high standard in the character of these exhibitions. It is very evident

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that the legislature believes in the local agricultural fairs. At its last session it increased the State stipend to agricultural societies from 1¼ to 2 cents for each inhabitant of the State, without a dissenting voice. It expects our county and local fairs to take a higher stand along lines of education, and that all cheap vaudeville and vulgar shows shall be discarded; that money appropriated by the State shall be used for the exclusive purpose of instruction in the important industry of agriculture. The State insists that all these objectionable features shall be eliminated. We trust the managers of the fairs will keep in mind that this increased appropriation was intended to do something more for agriculture, and that they will realize more fully the possibilities of the fair as an educator in these lines.

It has been the intention of the societies to comply with the law in relation to gambling and the sale of intoxicating liquors on their grounds. A few complaints have reached the office that the law was not complied with, and an investigation has shown a delinquency in this respect, to the detriment of some of the societies. The officers of the societies should see that both the spirit and the letter of the law are fully complied with.

The following figures show the business of these societies for the year 1907:

Number of horses and colts exhibited	1,626
Number of neat cattle exhibited	5,535
Number of sheep exhibited	1,229
Number of swine exhibited	472
Number of poultry (coops) exhibited	2,607
Amount of premiums and gratuities awarded	$26,802 86
Amount of trotting purses	$21,181 86
Per cent of premiums and gratuities to total awards	56
Per cent of State stipend	51
Number of societies receiving stipend	40

PUBLICATIONS.

The requests for the annual report of the department have been very numerous, and the supply has been entirely inadequate to meet the demand. We have also had many requests for our quarterly bulletins. This would indicate that the farmers are becoming more interested in agricultural publications and

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more aware of the valuable information which may be secured for the asking. In reviewing the results of a cow census taken in some of our neighboring states, it is surprising to note how closely the profits of the herd have corresponded with the reading of dairy literature on the part of the owner. The success of the farmer is dependent to a larger degree than is sometimes realized on the amount of intelligent information which he possesses, and the closeness with which he keeps in touch with the improved methods in agriculture which are discussed in the best agricultural publications. It is an encouraging sign for our agriculture that farmers are taking more interest in these lines.

The quarterly bulletins published, which have averaged 30 pages, have contained articles by the best authorities on the subjects treated, expert scientific men and practical farmers, and much pains have been taken to make them of practical value to the farmers. No. 1 treated on The Gipsy Moth in Maine; No. 2, The Management and Application of Farm and Commercial Manures; No. 3, Potato Culture; No. 4, Swine Growing.

Circulars in relation to insect pests have also been issued during the year by the State Entomologist.

AGRICULTURAL EDUCATION.

The Department of Agriculture is still working in the direction of more education in agriculture in the public schools of our State. We fully believe in the advantages of an extensive general education. It makes broader and better citizens; it creates loftier and noblier ideals; it trains the mind to logical and systematic thinking; it develops the reasoning powers. And there is no man who needs a broader, more liberal education than the farmer. The problems which he is called upon to solve cover a wide range of thought, and require a trained, alert mind for their solution. If agriculture in its diversified forms is the basis upon which progress and prosperity must stand, it is essential that the farmer should have the broadest of educations. But in addition to this public education, we have always been of the opinion that a special training in agriculture is a very important matter, and that, to be efficient, it must begin in the early days of school life. There is no addition to our school

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curriculum that will be of more practical benefit than the teaching of agriculture in the rural districts and the mechanic arts in the city schools. This gives the farmer boy an opportunity to learn the science of his business and brings within the reach of the poor boy in the city a school of technology. We believe the bill introduced in the 59th Congress by Representative Davis of Minnesota has many features that commend it. This bill is an extension of the Morrill Act, and proposes to place a practical, industrial education within reach of the masses. It provides that the government shall meet the individual states half way in the establishment and maintenance of public school instruction in agriculture, the mechanic arts and home economics. We cannot lay too much emphasis upon the thorough teaching of agriculture in the rural schools. This preliminary training in agriculture will do much towards making an intelligent, successful farmer, and those who have the means and can take an extended course at the Agricultural College, will be proficient in their calling. When our people are educated along this line, agriculture will become a more desirable and more profitable occupation. As it is the leading industry, it is eminently fitting that the State should educate her citizens in this direction.

Our country homes are the bulwark of the Nation. Upon the rural sections rests the responsibility of maintaining and developing a government of the people, for the people and by the people. Let us give them the best facilities for education, and in them we shall find the best type of intelligent citizenship.

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INSTITUTE PAPERS.

SOIL FERTILITY.

By Prof. FRED W. CARD, Sylvania, Pa.

The fertility of the soil is represented by four fundamental factors,—texture, moisture, plant-food, and living organisms. By soil texture we mean its physical condition, whether mellow and friable, soft and sticky, or hard and lumpy. Texture is important for the following reasons: First, the moisture capacity is increased; second, the air capacity is increased; third, it aids in rendering available plant-food already in the soil; fourth, it lessens extremes of temperature; fifth, it affords better conditions for root growth.

Good texture may be maintained in a fertile soil or restored when lost, by the following methods: First, underdraining. This is applicable only to wet, undrained soils, or those with a heavy subsoil. The first object of underdraining is to remove surplus water, thereby rendering it possible to work the soil earlier in the spring and sooner after rains. A secondary effect is to make the soil warmer. The evaporation of water consumes much heat. When hundreds of barrels of water lie on a low field to be evaporated by the sun's rays, its heat is entirely absorbed in doing this work; consequently a wet soil is well termed a cold soil. Underdraining also increases the feeding ground for roots. A water-logged soil, or one in which the water-table stands near the surface, induces surface rooting of the plants growing upon it, as roots will not readily enter a compact, wet soil. Removing this surplus water enables them to run deeper. Underdraining also enables land to withstand drought better, largely for the reason just cited. Roots in an undrained soil, running near the surface, are in a position

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to suffer quickly if dry weather comes. When rooting more deeply they can draw moisture from greater depths, hence suffer less. Underdraining may also lessen washing of land, since in a heavy rain water will enter the soil more quickly and a larger quantity be taken up before it begins to run away from the surface.

Good tillage is a second method of improving texture. This is accomplished both by pulverizing and deepening the soil. The plow is the most important implement of tillage. Its primary object is to pulverize and crumble the soil. For this reason the plow with a steep mouldboard, which turns the furrow sharply, is the type to be chosen. Merely inverting a furrow and laying it smooth and straight does not constitute good plowing. Gradually deepening the furrows from year to year, turning up each time a little soil which never saw the light before, will improve the conditions for plant-growth. A secondary effect of tillage may be that of hastening the drying and warming of the soil in early spring.

Adding vegetable matter, or humus, to the soil, is the most important means of improving texture. This is nature's method. She first breaks down the rock, then grows some plant in it, poor though it may be. This plant decays and furnishes opportunity for a better one, until at last the forest crowns the scene. Humus is important for a number of reasons. 1. It improves the physical condition of the soil, making it dark colored and mellow. 2. It adds plant-food. 3. It increases the water-holding capacity. 4. It modifies extremes of temperature. 5. It facilitates entrance of air. 6. It stores up nitrogen and prevents loss by leaching. 7. By its decay it supplies nitrogen and renders available phosphoric acid and potash in the soil. 8. It affords food for beneficial soil organisms. Its importance in affording a storehouse for nitrogen, thereby preventing the waste of this expensive element, and in increasing the moisture capacity of the soil, can scarcely be over estimated.

How can this humus be obtained? First, by the addition of stable manure. In market gardens where large quantities of manure are used, this means alone is sufficient to maintain the texture of the soil, but in farm operations the supply is too small. Plowing under a growing crop will rapidly increase the

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humus supply. This is necessary only on poor soils. With a field badly run down and lacking in humus, it may well repay the outlay. If a grain crop is used and allowed to ripen before turning under, the grain may at once spread and form a second cutting, to still further add to the supply. If heavy crops of clover or grain are turned under while green, it sometimes has the effect of souring the soil to such an extent as to injure the succeeding crops.

The most important means of maintaining the humus supply in ordinary farm operations is by means of a systematic rotation, in which a heavy sod is frequently turned under. A mistake all too common is to allow grass land to remain until it is badly run out and the sod largely lost before plowing it up. In that case there is little left to benefit the soil, while weeds are generally present to cause future trouble. If the rotation is short and the land plowed while the sod is heavy, the gain will be great.

A systematic rotation possesses other advantages aside from this, some of which may be mentioned here. 1. Plants differ in their power of extracting plant-food from the soil. Land which will not produce a good crop of wheat may produce a good crop of oats, although the latter requires more plant-food. 2. Plants differ in the demands made upon the soil. To grow one crop continuously, therefore, tends to exhaust certain elements of plant-food. 3. Some plants send their roots deeper than others, thereby bringing up food from the subsoil for their own growth and the benefit of succeeding crops. 4. Some plants can gather nitrogen from the air and leave a residue for succeeding crops. 5. Humus can be introduced. 6. The ground can be kept covered. 7. Insects are less likely to cause injury. 8. Diseases are less likely to be troublesome. 9. Weeds are more easily controlled. 10. Work may be better distributed throughout the year. It is in maintaining the humus supply, however, that a rotation plays its most important part.

Moisture constitutes the second factor in soil fertility. Its importance may be realized from the fact that it has been estimated that a crop of two hundred bushels of potatoes per acre requires something like a million and a quarter pounds of water for its growth, and a crop of corn somewhat more. The soil

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water may be held as free water, filling the spaces among the soil particles, or as film moisture, surrounding these particles with a film. The latter condition is the one desired. Free water shuts out the air and renders conditions unfavorable for growth. The capacity of the soil for moisture can be increased by underdraining, which improves the texture, by proper tillage, which increases the depth of the tilled soil and pulverizes it more thoroughly, and by the addition of humus, the latter being the most important. Compare subsoil taken from the bottom of a ditch or cellar with the same soil intermingled with decaying humus, and the latter will be found to take up and hold decidedly more moisture. This addition of humus also enables soils to suffer less from wet weather, since it renders the soil lighter so that water will drain away from it more quickly than from a heavy soil.

The soil having been put in condition to take up and hold the greatest amount of moisture, the next problem is to so manipulate it as to prevent the waste of this water supply. Preventing weed growth is the first means of accomplishing this result. Every weed acts as an automatic pump to extract moisture from the soil and throw it into the air. Destroying the weed checks this loss. Even without weeds moisture is being given off from the surface of the ground. To blanket this in some way to prevent this loss, should be the object of summer tillage. A mulch of straw will accomplish the result, but is impracticable except in special cases. A shallow layer of dry dust will accomplish much the same result. This can be had by frequent shallow cultivation, which enables the parts stirred to dry out quickly and remain so. This breaks up the capillary movement of water to the surface and holds it below. Gradually such a blanket settles and re-established the connection. Every shower of rain destroys it, hence cultivation must be frequent to be effective. It should be shallow because every inch used for a dust blanket is an inch taken from the effective soil in which roots can work. Two inches will be deep enough for average conditions. In this connection it should be remembered that cultivation never adds one drop of water. It only helps to save what is already there. To wait, therefore, until plants begin to suffer and then cultivate, will do little good.

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Plant-food represents the third important factor in soil fertility. Plants demand certain so-called elements, which are really compounds. Fortunately most of these are present in sufficient quantities in all soils. Only the nitrogen, phosphoric acid and potash are likely to be lacking and to be needed in fertilizers. Lime may sometimes be needed, but usually to correct acidity of the soil, not to supply plant-food.

Of these three needed elements, nitrogen is the most important from a practical standpoint, because the most expensive. It costs 15 to 18 cents a pound in the fertilizer market, while the phosphoric acid and the potash may be had for 4½ or 5. Furthermore, nitrogen is unstable and easily lost. If in a condition to be used by the plant, it may be readily dissolved in water and washed away. It may likewise undergo changes which permit it to escape into the air as a gas. This element may be obtained, as are all the others, in stable-manure, but if this is improperly handled a large proportion of the original supply may be lost before reaching the field. Fully half the nitrogen is contained in the liquid material. If this is allowed to escape, one-half is lost at the outset. If the remainder is thrown under the eaves and allowed to leach for six months, half of what remained is probably gone, so that the proportion which finally reaches the field is small indeed. Nitrogen may also be obtained from nitrate of soda, which is the most quickly available form. This is as readily dissolved as common salt, hence should be used only when plants are ready to take it and in frequent, light applications, not in large quantities at one time. Nitrogen may also be obtained from sulphate of ammonia, dried blood, tankage, hair or ground leather. In the latter forms it is only slowly available for plant growth and may be of little value to the crop to which it is applied. It, therefore, is not enough to know that a given fertilizer contains the required percentage of nitrogen. The source from which that nitrogen comes should also be known. For this reason the purchase of chemicals and the home mixing of fertilizers possesses a marked advantage in that the farmer may know not only the percentage which the materials contain but the character of those materials.

Phosphoric acid may be abtained from bone preparations or from the phosphate rock so largely mined in the Southern States.

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In the condition in which it is mined it is thought to be largely unavailable. However, recent investigations seem to indicate that mixing this ground rock with stable-manure or other decaying organic materials may make it available. Acid phosphate is the commonest form in which this is used. To make this, a ton of ground rock is treated with approximately a ton of sulphuric acid, making two tons of acid phosphate. When this material liberates the phosphorous in the soil, the sulphuric acid remains behind as a residue. Its continuous use will in time make the soil so sour that some plants will refuse to thrive, notably clover, timothy, beets, etc. The same result follows the continuous use of sulphate of ammonia as a source of nitrogen. It therefore becomes necessary to apply lime from time to time to soils upon which these fertilizers are extensively used.

Wood ashes afford one of the best sources of potash, but unfortunately the supply is altogether too limited and the chief source must be the German potash salts, chiefly muriate or sulphate.

A common belief among farmers is that the chemist might take a sample of their soil and tell them just what it needs. The chemist would do his best, but his answer would have less value than one which the soil itself may give. To test this matter, lay out individual plots of convenient size, say four rods square, making one-tenth of an acre, and apply to one nitrogen and phosphoric acid, to another nitrogen and potash, to a third phosphoric acid and potash, to the fourth all three elements and so on, making as many variations as may seem necessary. A careful study of these plots will give a far better clue to the needs of the soil than any other plan.

The purchase of fertilizers is necessary in many of our New England States, yet it affords one of the easiest means of allowing money to slip through one's fingers. It is easier to go to the dealer and buy fertilizer than to properly till and manage the land, but it will yield less profit if the conditions for its use are not right. It is far wiser to husband all the home supply of plant-food, and to so handle the soil as to keep it in the best physical condition and well supplied with humus. If then fertilizers are used, the farm is in condition to make the best possible use of them.

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Living organisms represent the fourth factor in soil fertility. Ground rock is not soil; it needs to be mingled with decaying plant material. It needs more,—it needs to be teeming with life. Destroy the life from a productive soil and you greatly lessen its fertility. A rich garden soil baked in the oven will not grow plants so well as before. This factor of soil fertility leads us to a field in which our knowledge is limited. These organisms or bacteria are too minute to be seen except with a powerful microscope, and even then only the trained bacteriologist can interpret what he finds. We are dependent largely upon his word for results. Deficient as our knowledge is, we know that these organisms do play an important part in plant growth. They even assist in the breaking down of rock and the formation of some of the mineral compounds in the soil. It is in connection with the great nitrogen problem, however, that they play their most important part. A load of stable-manure or rotted straw spread upon the fields contains some nitrogen but very little of this is in a form in which plants can use it. It must undergo several changes before reaching that stage. First, it is seized upon by one class of bacteria which break it down or decompose it, changing it to the form of ammonia. In this stage plants may utilize it to some extent, though it is generally believed that but little of the nitrogen is taken in this form. Another class of organisms must take this ammonia and add to it an atom of oxygen, changing it to the form of nitrous acid. Still it is unavailable, and a third kind must take this nitrous acid and add still more oxygen, changing it to the form of nitric acid. This can then combine with the lime or potash or the sods of the soil to form a nitrate, which is the condition in which the plant can readily take it up. Notice that this process is largely one of the addition of oxygen. This means that there must be air in the soil, and emphasizes the importance of good texture which admits the air. With the air shut out another class of organisms may seize upon nitrogen already in the form of nitrates and carry it back to unavailable forms, even to free nitrogen where it may escape into the air.

With the best of management some nitrogen will be lost. With bad management these losses will be heavy. Experiments in Minnesota have shown that four consecutive crops of wheat

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reduced the nitrogen supply of the soil by nearly 700 pounds per acre, although the wheat itself used but 98 pounds. Continuous cropping with oats and barley caused even greater losses, but a rotation in which clover entered once during the four years increased the amount in the soil by nearly 250 pounds, although the crops themselves had used much more than did the wheat crop. Were there not some way of reclaiming this lost nitrogen, this earth would long since have been barren, for with the best of management some loss is inevitable. This loss is made good in two ways: One class of germs which work in the soil are able to fix free nitrogen directly in the soil, to a limited extent, so that soil which is frequently stirred and tilled gradually grows richer in nitrogen if there are no wastes. The amount has been supposed to be too small to have much practical value, but no one really knows how great the gain may be.

In spite of the fact that every plant is surrounded by a wealth of nitrogen in the air, our common crops, such as cereals, corn, potatoes, etc., are unable to make use of this supply. The clover family and its relatives, the peas, beans and vetches, have the ability to get hold of this exhaustless supply. It is done, however, by means of still other types of soil organisms or bacteria, which work upon the roots of these plants. The nodules to be found upon the roots of the clovers, the beans and the peas are teeming with bacteria. In some way these minute organisms make use of the nitrogen contained in the air of the soil for their own growth and thereby enable the plant to use it for its growth. We may grow a crop of clover, harvest it and carry it to the barn, and still leave behind in the roots and stubble more nitrogen than the soil contained before the crop was sown. Note that here again air in the soil is essential.

Another essential is that the soil shall not be acid, for these organisms will not thrive in a sour soil. If that is its condition lime will be necessary to enable them to do their work properly.

The importance of these organisms has led to attempts to introduce them into the soil by artificial means. Several years ago a German preparation was advertised which it was hoped would add to the ability of soils to take nitrogen direct from the air, thereby benefiting such crops as oats and corn by the introduction of the particular germs which do this work. The

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results, however, were not encouraging. A more recent and more promising attempt has been to inoculate soils with the particular germs which thrive upon the roots of alfalfa or other special leguminous plants. This practice has merit when a plant is introduced upon a soil where it has never been grown, and where the particular germs which thrive upon that plant are lacking. Unfortunately some of the methods of preparation have been unsatisfactory, and have tended to throw the whole matter into disrepute. It should be remembered that little is to be gained by introducing these germs into a soil where they already exist, as, for instance, adding clover bacteria to fields where clover thrives. In attempting to introduce a new crop, like alfalfa or soy beans, however, a marked advantage may be gained, if the method of handling is successful. Sowing and harrowing in a little soil from a field upon which the particular crop is successfully grown, is one of the most certain means of successfully inoculating a new field.

These, then, are the four fundamental factors of soil fertility, —texture, moisture, plant-food and living organisms. To secure the conditions which favor them all, means good tillage, accompanied by underdraining if necessary, a systematic rotation which adds liberally to the humus supply of the soil, and thorough cultivation to maintain the moisture supply. A fertile soil must be mellow and friable, in condition to admit air readily, to take up moisture quickly and allow the surplus to drain away, to hold a good supply for future needs, and it must not be so acid as to prevent the work of the unseen germs within it. If these conditions are met, artificial fertilizers, if needed, will give their best results.

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FARM SANITATION AND THE IMPORTANCE OF PURE, CLEAN MILK.

An abstract of various addresses made by Dr. HENRY D. HOLTON, Secretary of the Vermont State Board of Health, at farmers' institutes in different parts of the State during March, 1907.

Too little attention has been given to the sanitary condition of farm buildings and their surroundings. Whenever possible the house should be situated upon high ground, where all the drainage would be away from, instead of toward it. The cellar should be dry, the bottom cemented, and the walls pointed up. Plenty of windows should be arranged to give sunlight and fresh air. The kitchen and living rooms should receive the first consideration. The kitchen, while not being too large, should have sufficient room for a stone or metal sink, with running water, both hot and cold. The walls should be painted, so that they can be easily cleaned. The floor should be of hard wood. There should be a sheet iron hood over the stove to carry off all smoke and steam, so as to leave as little pollution of air as possible. Good ventilation should be provided, and plenty of windows for sunshine. The living room should be a pleasant, cheerful room, with windows unobstructed, so as to give here, as in the sleeping room, plenty of air and sunshine. The sink drain and all sewage from the house should be disposed of by the sub-soil method of drainage and not emptied into some stream of water, as it is desirable to keep all bodies of water free from sewage. Subsequently we shall speak of the necessity of having the barn in a sanitary condition, as well as all other outbuildings. In most instances, instead of a water closet, there should be a dry earth closet, which should be cleaned every week. Preferably the milk room should be in a building by itself, but if it is a part of the house, it should be used for nothing else and kept scrupuously clean. The water supply should be from springs, first determining by analysis that the water is safe and free from all impurities.

Among the questions to be met with by sanitary authorities there is none of greater importance than that of the production

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of a supply of pure, clean milk. Our national government is meeting the question of food adulterations, so far as it can, in cases of interstate commerce. There are two factors which control, very materially, the keeping qualities of milk. The first is *absolute* cleanliness from the moment the milk is drawn from a healthy cow, until it is delivered into the hands of the consumer. The second is the temperature at which the milk is kept during this period. If these conditions are complied with, it is certainly possible to insure a perfect milk supply.

In order to do this we have three things to consider—the farm where the milk is produced, the transportation to the consumer, and the household in which the milk is kept before it is used. In some instances there are other considerations, when the milk is not delivered direct to the consumer. The milk must be from cows not less than fifteen days before calving, nor five days after. The cows must be healthy animals. Milk must not be adulterated by water, nor any substance whatever. It must be kept at fifty degrees, or below.

The first thing to consider at the farm is the condition of the barn. Dirt and dust, usually so abundant in an average barn, readily get into the stream of milk or pail, and form a fruitful source of bacterial contamination. The common sources of dirt from the hay loft overhead, cobwebs on walls and ceilings, loose boards, dirty windows, floors of dirt, unclean manure gutters, and dust that accumulates on all things in a barn—this kind of a barn will fill the milk with a very large number of bacteria. A cow milked in such a barn as this showed 120,000 bacteria to each cubic centimeter, but when milked in a pasture in open air, 26,000.

The second thing to consider is the condition of the cow. Much dirt that gets into milk comes directly from the cow. In milking the udder is pulled down, which loosens dandruff, hairs and dirt from all the parts. In cleaning a cow for milking, the folds between the udder and the flanks, and dirt on tail, should receive particular attention.

In order to get pure milk the cow should not only have a clean barn, proper food and care, including carding to make the skin healthy, but she should have a well lighted stable, and have at least 1,000 cubic feet of air space and one hundred square feet of floor surface for each cow.

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A large proportion of diarrhœal diseases of infancy and childhood are due to impure milk with which they are fed. It is estimated that two million infants die annually in this country from impure milk. This is more in twenty-five years than the number of men that have been killed in all wars.

It should be impressed upon all persons having in their possession, even temporarily, bottles, cans, or other receptacles containing milk or cream, that they should clean them *immediately* after the contents are removed, and that these receptacles should never be used for any other purpose.

Great care should be taken, not only of the stable, but of all the utensils used, and the milkers should have clean hands, and put on clean overalls and jumpers, before repairing to the stable to milk. In addition to the daily care of the cow they should take with them a damp towel and wipe off the udder, side and all parts exposed to the milkpail.

Persons having a sore throat, which might possibly be diphtheria, or who have not fully recovered from scarlet fever and are still desquamating, or who are affected by tuberculosis, should never be allowed to come near the milk. There are many cases on record where such persons have contaminated the milk and led to epidemics along the routes where the milk was distributed. All dairy cows should be tested once a year with tuberculin to determine if they have developed tuberculosis. While usually the bacilli of this disease will not appear in the milk unless the udder is affected, there are many instances reported where they have appeared in milk of cows suffering from this disease, without the udder being affected. The theory of Dr. Koch that a disease in a bovine could not be communicated to human beings has been repeatedly shown to be a mistake. In many instances the bacilli of the bovine which are clumped at the ends, as well as the straight, round rods of the human bacilli, have been found in a person suffering from tuberculosis. A cow suffering from this disease may not only have the milk contaminated, but the dairy products, both butter and cheese. You will recall that not only the national, but the pure food laws of the various states as well, prohibit the use of foods which contain anything likely to make them injurious to the health of the consumer. The presence of these bacilli in the milk and dairy foods is equally serious and should be most carefully guarded against.

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PURE MILK.

By E. D. Howe, Marlboro, Mass.

Progress and improvement are the watchwords of the hour. Inactivity means stagnation and stagnation has no place in modern business life. Many, varied and rapid have been the changes in the mercantile and manufacturing world. As evidence of this we have but to recall the great strides forward in the manufacture of shoes, clothing, machinery, tools, etc. No longer does the shoemaker, with slow and laborious toil, cut and stitch and peg until he produces from the stiff tanned leather a single pair of coarse and ill-fitting, though serviceable shoes, but with power driven machinery he divides with a score of others the task of evolving a hundred pairs of easy, glove-like foot coverings that are veritable works of art. And not only this, but each separate pair must also be wrapped in tissue paper and enclosed in a pasteboard box lest haply they become scratched or marred before their final owner shall have degraded them to contact with mother earth. The beautiful, glossy finished, artistically designed, machine woven linens of today bear little resemblance to the coarse, homespun fabrics of our grandmothers' hand-looms.

No less marked, though possibly less rapid and less complete, have been the changes in the agricultural world and particularly along the lines of producing and handling milk. When we consider that milk constitutes almost the only food of half the babies born into the world and of all of them after the first few months, and when we find from statistics that a million of these little ones die annually from trouble directly traceable to milk, we feel that it is vitally important that everything possible be done to guard the purity and healthfulness of this very important food supply. What, then, are the conditions which surround the production and sale of pure milk, and which must be observed if its absolute purity is to be guaranteed? And here, permit me to remark that it is just as essential that these conditions should be maintained whether the product is sold as milk or as cream or butter, or any other of the numerous articles of food of which milk is the chief constituent.

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Probably we shall all agree that the first thing to be considered in the pure milk problem is the cow. We will not concern ourselves with the breed of the cow or with the question as to whether she shall be of any particular breed, these being matters that will largely be determined by the disposition that is to be made of her product. But whatever this disposition is to be, it is vitally important that she be, beyond the suspicion of a doubt, a healthy animal. In view of the fact that the latest decision of scientific investigators confirms the view already held by many that tuberculosis is transmissible from animals to man, it is especially important that everything possible shall be done to eliminate this disease from our herds. Milk that shows signs of a fevered condition of the cow, such as bloody or gargetty milk, should be religiously excluded and no milk should be sold as food from any cow which is drawn within 8 days after calving or within two weeks previous to parturition. The cow should not be unduly excited at any time by violent handling or even by violent language, for the excitement thus created will surely cause a fevered condition of the milk which in turn will affect the nervous condition of young children to whom it may be fed.

The cow should be carefully groomed every day, as much for the healthful action and reaction of her skin as for her neater appearance. She should have good, wholesome food in sufficient quantity and of enough variety to maintain a vigorous, healthy appetite. Avoid the feeding of city garbage to cows. It is a debatable question as to whether such stuff may be safely fed to hogs, but to cows, never. I am personally acquainted with several families where the children were made seriously sick by drinking milk from swill-fed cows. See that the cow has plenty of pure water to drink, as good as you drink yourself. Personally I prefer a watering device that automatically supplies this water so that the cow may drink as much as she wants and whenever she wants it.

After the cow, the next consideration in the pure milk problem will be the stable. And right here is where very few of us will lay claim to ideal conditions. But the fact that our conditions are not now ideal, is no reason why we should not have an ideal, towards which all our energies and efforts should tend until that ideal becomes a reality.

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The two great essentials of a healthful stable are plenty of sunlight and plenty of pure air. If possible, have the windows so arranged that at some hour of the day, the direct rays of the sun shall hit every foot of floor space. Sunlight is sure death to disease germs and it is next to impossible to rid a stable of tuberculosis without it. This is the chief objection to a basement stable. Handy and convenient as they are, and capable of being well lighted and ventilated, it is still impossible for the rays of the sun to reach the central portion of the floor space.

A tie-up extending the whole length of the barn, especially if on the south side, offers a better chance for the sunlight to get in its effective work.

But far better than either of these is the separate cattle barn wing running out at right angles from the main barn, with a plentiful supply of windows on three sides and with a monitor roof, also freely supplied with windows all of which are hinged to open by swinging inward for the purpose of ventilation, when the winter system of ventilation is not in use.

And this brings us to the consideration of that other necessity for the production of pure milk, viz. pure air. The King system or some modification of it is generally conceded to be the best method of ventilating all buildings which are not artificially heated or otherwise provided with mechanical appliances for creating currents of air. The King system contemplates the equalizing of the temperature by conserving the animal heat while at the same time the air is changed with sufficient rapidity to remove the poisonous gases and keep it sweet and pure. As the successful working of the King system is contingent upon having all openings closed, other than those provided by the system itself for the intake of fresh air and the outlet of foul air, it is especially adapted for winter use and for cold climates.

To adapt the King system, therefore, to a tie-up running the length of the barn, it is essential that the space between the cattle and barn floor be boarded up and that the trap doors for feeding shall be kept closed. If the wall in the rear of the cattle is boarded to upright studding the space between two studs can be boarded up for fresh air shafts. If the tie-up is already sheathed on the inside, the cold air shafts are already made and only need the necessary holes cut to admit the air. These holes

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should be cut near the bottom on the outside of the building and near the top on the inside of the tie-up. The cold, fresh air will thus enter near the top of the tie-up where it strikes the warmer air of the interior, and cold air being heavier than warm air, it gradually falls towards the floor, mixing all through the warmer air of the stable. The number of these intakes will depend somewhat upon the size of the tie-up. The size of the inside opening can be regulated by a wooden slide as the draft will be greater on a windy day than on a still day. Now to provide for the outlet of the foul air wooden chimneys are built of sufficient size so that there shall be 2 square feet of opening for each 10 cows, and extending as straight as possible to a height equal to the ridgepole of the adjacent building and extending below to within 1 foot of the floor of the tie-up. The object of this is to prevent the warm air escaping at the top of the tie-up and compelling it to take a downward turn before it can obey the call of the wooden chimney to "come up higher." In this way a complete circulation of the air in the tie-up is obtained and no foul odors remain behind.

The man who takes pride enough in his farm to have healthy cows, properly housed in well-lighted and well ventilated stables, will seldom be found wanting in the other essentials of pure milk production. But as all of us are inclined to be a little slack in our diligence unless "provoked to good work" it may be well for us to go a little further and enumerate the things which are very desirable, nay rather essential if we are aiming for a pure and wholesome product. Do not feed dusty hay, nor sweep the tie-up previous to milking. Wipe the side, flank and udder of the cow with a damp cloth before milking. Use a pail with wire strainer to milk through, thus preventing particles of dirt, scales and hair from getting into the milk. Take the milk as fast as drawn to a separate dairy room and strain through several thicknesses of cheese cloth, cooling and aerating it immediately.

See that all tin utensils are properly washed and sterilized with steam or hot water.

Milk which is thus made and handled will comply with all the reasonable requirements of boards of health and will be entitled to the designation "Pure Milk." In this address no attempt has

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been made to describe the finer points and niceties which enter into the production of so-called "sanitary" and "certified" milk as the demand for these latter products is very limited, and can only be catered to by men of wealth or by a few exceptionally located farmers. But "pure milk" is within the reach and should certainly be the goal of every honest, self-respecting producer.

The farmers of Maine have reason to feel justly proud of the high standing of their butter and cream in Boston market. But while your butter makers and creamery men have by careful and painstaking effort succeeded in capturing these prizes for the excellence of their products they will soon slip from their grasp unless you, the producers of the milk, co-operate with them by furnishing them "raw material" of the purest possible quality. My brief visit to your State has convinced me that a glorious opportunity, unexcelled by any of similar character in Massachusetts or elsewhere, awaits those of your farmers who will put the necessary time and effort into the production of pure milk.

MAN THE CUSTODIAN OF THE SOIL.

By A. S. Elliot, Galt, Ont.

The soil is the natural inheritance of man and the only source of life. Since life was first called into existence it has been sustained and perpetuated only from the soil, nor is there any other source by which it in time to come can be maintained.

The soil is the fundamental creative power of the world; all other forces are called into existence by the ability of the soil to produce food and protection from the elements, which are after all the only prime necessaries of man. For those the prince and the peasant, the millionaire and the beggar are alike dependent on the soil. My lady, her table laden with the choicest viands—the product of five continents, her body clothed in silk and fine linen, alike with the humblest dependant on her bounty, clothed in rags and eating his hand-out in the shelter of a hedge, depends upon the soil for all of life's needs.

The manufacturer takes of the products of the soil, and by the help of skill and labor develops what is required by our com-

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plex civilization but in a true sense he originates nothing. The farmer takes of the forces of nature—moisture, air, light, heat and even cold and darkness combine themselves with soil—and creates a crop, and in so doing he can leave the creative power of the soil intact, provided he handles his land intelligently. This brings out another feature, viz. the importance of so handling our soil as to get all that is necessary for our wants and yet not impair its ability to grow crops.

If, as has been outlined, the soil is the only source from which all life in time to come must be maintained, then no man has a moral right to so handle his soil that it will be harder, if not impossible, for succeeding generations to live. The national life, not to mention its prosperity, is dependent on the fertility of the soil. A farmer of three score years and ten tells me that this is his farm; he has redeemed it from the wilderness and has made it to blossom as the rose. He has paid for it, and it is his. No man has a right to dictate to him how he shall handle it. He can reduce its fertility if he so desires, as it is his. Not so fast. Of that farm he has only a life lease for long after he has passed away that land which he has so fondly called his own will still have to provide food to sustain the life of those then living, so morally speaking no man has a right, by a careless, not to say vicious system of farming, to imperil the very life of succeeding generations.

The American farmer, perhaps more than any other, has forgotten this. From the time when the Puritans first landed at Plymouth, from the time the cavaliers first occupied old Virginia up to the present time American farming has been a system of wholesale soil robbery. The center of American farming operations has been gradually moving westward leaving behind a trail of impoverished soil, impoverished to such an extent that in many instances it has been abandoned as utterly worthless and thrown out of cultivation to regain fertility by the slow process of nature. This is true not alone in one locality but in many. The writer has seen the mark of the plow in the young forests of New Brunswick, has seen the abandoned farms in New England, and in the cotton states dense forests are growing where before the war cotton was grown, until it will

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no longer grow in paying quantities, and then the land has been turned out of cultivation to gain fertility by the same slow process.

The writer well remembers when the Genessee Valley in New York state was the noted wheat growing centre of America. Gradually the center shifted westward until apparently it has left the United States and is now in Canada. To prove that this condition of wholesale soil robbery has assumed an alarming proportion it is only necessary to mention the fact that one of the principal wheat growing states, that at one time averaged 24 bushels per acre, has, for the past four years averaged a trifle under 11 bushels.

The question of preserving the power of the soil to grow crops is one the importance of which is supreme over all others. Political parties may rise and fall, and from their fall may arise others better suited to the requirements of our changing conditions; terrestial convulsions, fire or financial panic may sweep away the wealth of the nation by hundreds of millions, but with a well tilled fertile soil to draw from those losses can speedily be replaced, for a fertile, responsive soil is the only basis of national prosperity.

The question naturally arises, "Can the farmer obtain all he needs from his soil and yet maintain and increase its fertility?" That is best answered by reference to what has been done in other lands. The soil of China has been under cultivation for thousands of years and yet it is exceedingly fertile. By statistics we find that the ability of the soil to grow crops in England has been materially increased during the past hundred years. Under natural conditions the earth gradually increases in fertility by the process of growing something upon it,—that is nature's method. No soil is so utterly barren that under ordinary conditions it will not grow something. The moss grows upon the rock on the mountain side and in growing breaks down minute particles of the rock converting it into soil, and in its decay adds to the humus in the soil, so necessary to plant growth,—this year's crop dying gives a more abundant promise of the life that is to follow.

How then should the farmer till his farm in order to get the most from it and still increase its fertility? It must be under-

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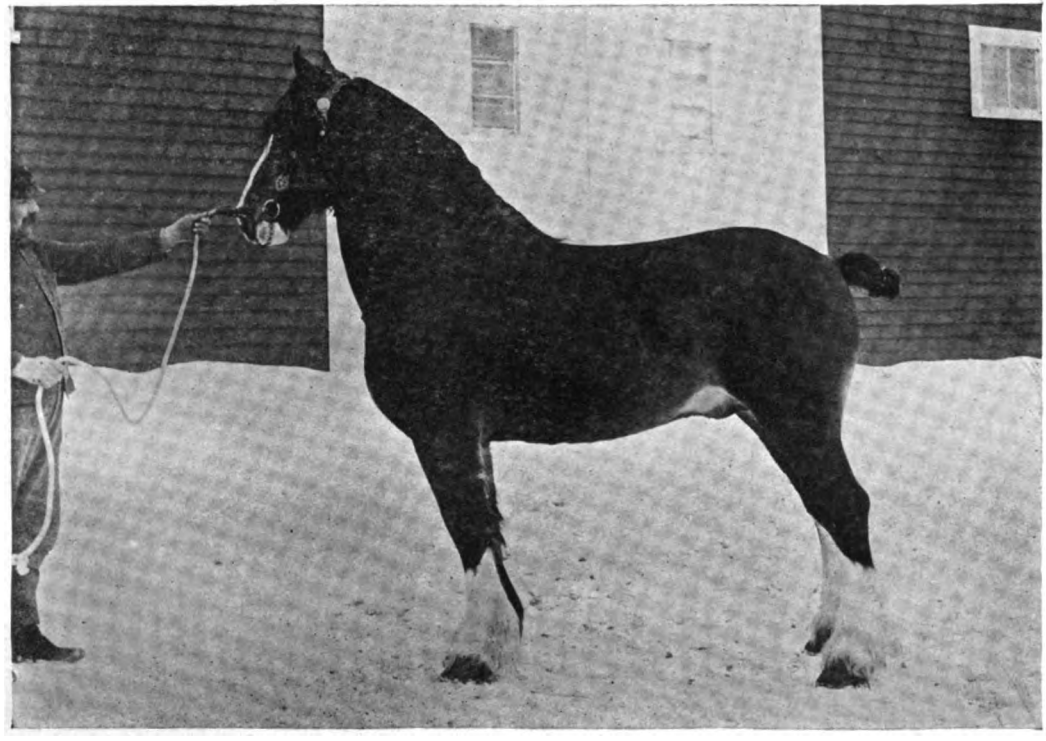
drained either naturally or artificially, for under all conditions free water in the soil is hurtful and in the most cases it is impossible to grow paying crops when it is present. We must follow a proper rotation of crops. This again is nature's method. Mark the variety of plants growing together under natural conditions. We have two great families of plants under our hand. They may be called nitrogen gathering and nitrogen consuming plants. Nitrogen is that element which gives the dark green color and vigorous growth to the plant. It is the most expensive to buy and the most easily lost of all plant foods in the soil, but can be obtained from the atmosphere in unlimited quantities by the introduction of some of the legumes, notably the clovers, into our rotation. The value of red clover as a soil renovator can hardly be over estimated. Its long tap root going down deep into the subsoil brings up plant food that is below the reach of shallow rooted plants. In their passage down the roots loosen up the subsoil admitting air, and in their decay they fill the soil with humus, or decaying vegetable matter which is really the basis of fertility. It has been estimated that the roots and crown of a good clover crop add from ten to fifteen tons per acre of vegetable matter to the soil. Clover, then, should be the foundation of the rotation and the narrower the rotation, or the oftener the clover is introduced in a series of years, the more rapid the upbuilding of the soil.

Every rotation should have a deep rooted nitrogen gathering crop, some of the clovers; a cleaning crop, roots or corn, and a shallow rooted crop such as one of the grains, with which should be sown the clovers for the following crop.

Perhaps there is more waste in manures than in any other item of farm management. Straw that ought to be carefully saved for feed or bedding is burnt or allowed to go to waste by the wayside; manure is thrown out under the eaves of a building, there to leach its value away instead of being at once drawn to the field and spread. There is no better way to dispose of manure than to spread a light dressing on the clover, either just before sowing the seed or just previous to winter. If this is done we will seldom have a failure of catch or have the crop winter killed. By the adoption of a suitable rotation of crops, the saving of manure, thorough tillage and selling only the fin-

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MAINE FARMER PRESS, AUGUSTA

Clydesdale Stallion, Peerless Pride, four years old (4584) (12471), imported from Scotland
Property of R. R. Cameron, Caribou

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ished product of the farm, such as live stock, dairy products, poultry and eggs, the farmer will better his position financially and do his part in promoting the prosperity of the nation.

I will close with a quotation from a well known authority: "The soil is no mere inert mass. It is a scene of life and activity." This is the new teaching. Soil that is wholly inactive is unproductive. Movements of air and water, actions of heat and evaporation, life rounds of countless minute organisms, decay and breaking down of plant and soil particles—these are some of the activities of the fertile soil. If our ears were delicate enough we could hear the shuffle of the workers, the beating of the hammers, the roll of the tiny machinery. All things begin with the soil and at last all things return to it. The soil is the cemetery of the ages and the resurrection of life.

CONCENTRATED FEEDS.

By PHILIP H. SMITH, Massachusetts Agricultural Experiment Station.

The term concentrate is meant to include those feeds which a farmer must necessarily purchase or produce to supplement the coarse fodders like hay and silage, in order to procure the best results in feeding his dairy herd. A narrower definition of the term includes only those feeds which increase the protein in a ration. Under earlier agricultural conditions in New England, all of the feed stuffs which were used in the maintenance of the farm animals were grown at home. Today it is the exception rather than the rule to find a farm where the entire ration of the animals comes from within its own boundaries.

The demand for feed stuffs other than those which the farm produces, has led to the utilization of many by-products hitherto deemed worthless. The refuse from the grinding and milling of cereal grains was naturally the first by-product to receive attention. This was followed by others in gradual succession until today the number of concentrated feeds is large and varied. No less than twenty distinct grades of feed, to say nothing of

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numberless brands, are offered for sale in the New England markets.

For convenience in discussion, concentrates may be divided into two classes, protein feeds, containing over 18 per cent of protein, and starchy feeds, which contain less.

Protein feeds may be divided into several classes:

1st. Oil mill by-products.

2nd. Starch and glucose refuse.

3rd. Brewery and distillery by-products.

4th. Flouring mill by-products.

5th. Some prepared foods which are for the most part low grade refuse to which has been added some substance rich in protein to improve the product and make it more salable.

OIL MILL BY-PRODUCTS.

Prime cottonseed meal consists of the ground meat of cottonseed from which the oil has been extracted by means of heat and pressure. A good quality of meal should contain at least 43 per cent of protein and 9 per cent of fat. Frequently a considerable amount of hulls are ground with the seed which makes a very inferior grade of meal. On account of its richness, cottonseed meal should be used in comparatively small quantities. When the meal is used in any amount, it makes a hard butter. By actual analysis, the manure where cottonseed meal has been fed, has been found to contain more plant nourishment than from any other feed.

The old process linseed meal is the ground linseed cake from which the oil has been removed by heat and pressure. It contains a higher per cent of oil than does the new process from which the oil has been extracted by means of chemicals. Most of the new process meal is sold under the brand of the Cleveland Flax Meal. Both the old and new process linseed meals have given satisfaction as milk producers. They do not contain as much protein as cottonseed meal but are safer feeds.

GLUCOSE AND STARCH FACTORY BY-PRODUCTS.

Every mature kernel of corn consists of an outer coating or hull of two distinct layers, directly beneath which lies a layer of gluten very rich in protein. The body of the kernel consists of

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starch while at one end of the seed is the germ. In the manufacture of starch from corn, the bran or hull is first removed by mechanical means; the germ is then separated from the remainder of the seed. The remaining part is then crushed and placed in water. The starch being light, stays suspended in the water and is floated off, while the heavier portion sinks to the bottom. This heavier portion when recovered and dried, forms what is known as gluten meal and contains 35 to 40 per cent protein.

The germ is steam heated and pressed to extract the oil. The residue is ground and put upon the market as germ oil meal. We have then from the manufacture of starch and glucose:

Corn bran, containing 10-12 per cent protein.

Germ oil meal, containing 25-30 per cent protein.

Gluten, containing 35-40 per cent protein.

The feed stuff known as gluten feed consists of gluten meal, hulls, and broken germs. (Larger part of germs go as corn oil cake or germ meal.)

Most of the starch and glucose by-products are sold in New England as gluten feed.

DISTILLERY AND BREWERY BY-PRODUCTS.

Distillery and brewery by-products include malt sprouts, brewers' grains and distillers' grains. In the process of making malt from barley, the grain is sprouted by keeping in a warm moist room for several days. When the malt is dried, the sprouts are removed by machinery and put on the market as cattle feed. They have not met with general favor because they are not usually relished by dairy animals on account of a slightly bitter taste. Many feeders prefer to feed them moist, especially if over 2 pounds are fed daily. They absorb a great deal of water and increase in bulk by wetting. *Brewers' grains* consist of the residue from the manufacture of beer. Very few of the dried grains are sold in Massachusetts, most of them being used moist by the farmers in the immediate vicinity of the brewery. The dried grains are somewhat superior to wheat bran in feeding value. Brewers' grains have been found to be an excellent partial substitute for oats as a horse feed.

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Distillers' grains consist of the dried refuse from the manufacture of whiskey or alcohol which may have been made from rye, corn, oats or barley, singly or mixed together in varying amounts. The corn distillers' grains contain the highest percentage of protein and are the ones oftenest met with in the Massachusetts markets. On account of their high protein content and bulky nature, they are quite favorably known. To many farmers, the terms, brewers' grains and distillers' grains are synonymous. There is a wide difference in feeding value. Corn distillers' grains are equal if not superior to gluten feed.

WHEAT FEEDS.

These are flour middlings, standard middlings, wheat bran and mixed feed. Wheat bran consists of the hull or outer part of the seed. Wheat bran as compared with other concentrates usually is an expensive feed and if it were not for its value as a diluter for more concentrated feeds, and as a regulator for dairy animals, its use would not be advisable at present prices. Only a little over one-half of the bran is digested, and assimilated by the animal. At the Massachusetts Experiment Station we have been quite successful in mixing rich concentrates with the ensilage and doing away with bran entirely.

The gluten cells of the wheat seed which are just under the hull, as in the case of the corn kernel, together with some of the hull and some of the starch, make up the middlings. In the standard middlings, the flour predominates.

Good mixed feed should contain all of the by-products of the flour mill, with the exception of the screenings. Some millers grind the screenings and incorporate them with the mixed feed, which produces an inferior article that can be readily detected by the black specks present.

During the last few years, adulterated mixed feed has been sold to some extent in New England. Most of this feed contains about 500 pounds ground cobs to 1,500 pounds mixed feed. Formerly, the feed was sold as a pure wheat feed but at the present time it is being sold in most cases on its merits.

A number of other protein feeds, most of which contain under 20 per cent of protein, might be mentioned. Among them are prepared stock foods, which contain, beside refuse from the

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cereal breakfast food manufactory, some gluten feed or cotton-seed meal to bring up the protein content. They usually contain considerable indigestible oat hulls and the price asked is as much as for better feeds.

Molasses which has been used for a long time as a food for farm animals in Europe and in the South, is gradually coming into use in New England. Malt sprouts or brewers' grains are the principal absorbents used with the molasses and the mixture is put out as molasses-dried-grains. Refuse molasses is also used as a feed in other ways but not in connection with protein feeds.

The principal starchy or carbohydrate feeds are corn meal, hominy meal, provender, corn and oat feeds, and oat feeds. Of these, corn meal is without a doubt the most generally used although hominy meal is becoming more favorably known. Hominy meal is a by-product from the manufacture of the hominy meal and the grits used as a human food. It consists of the softer parts of the corn kernel. It contains about 5% more fat and 2% more protein than straight corn meal. It seems to be about 10% less digestible than corn, but because of its dry condition, has about the same feeding value. Corn and oat feeds, and oat feeds are refuse from the manufacture of cereal breakfast foods. Often a small amount of a more concentrated feed is added to increase their protein content. At present prices they are expensive feeds, carrying as they do a large amount of indigestible fiber in the form of oat hulls. One other starchy feed that it may be well to mention, is dried molasses-beet-pulp. The product consists of the residual pulp from sugar beet manufacture, with which has been mixed a considerable amount of waste molasses. The mixture is thoroughly dried before putting on the market. It has the quality of increasing greatly in bulk when moistened and it might be well to wet the product *before feeding.*

Why are only protein and fat guaranteed? Do the other constituents of a food have no feeding value? are questions often asked. Protein is guaranteed because it is by far the most necessary and costly nutrient for the farmer to purchase. Fat is guaranteed firstly, because it furnishes 2¼ times as much energy as carbohydrates, and secondly, because an excess inter-

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feres with digestion and normal milk secretion and is to be avoided. The percentage of protein and fat serve as an index of the character of a feed. A guarantee of fiber, woody material, in addition to protein and fat would furnish a better index to the character of feed stuffs which contain an excessive amount of fiber and consequently less of the more digestible nutrients.

There are certain specific substances in a feed stuff which are used for certain well defined purposes in the animal. Chemists divide a feed stuff into five parts: water, ash, protein, carbohydrates and fat. The ash or mineral part builds up the frame work or skeleton of the animal and assists in some of the processes of digestion. Protein produces lean meat or muscle, the casein of milk and to some extent, body and milk fat. The carbohydrates, which include starch, sugar and fiber or the woody part of the plant, are used to produce energy, heat, body and milk fat.

THE MAKING OF GRAIN RATIONS.

The dairy cow is so constituted that to give the best results she must have a certain amount of protein in her ration. This depends upon the size of the animal, amount of milk produced, quality of the milk, and stage of lactation. Authorities differ as to the necessary amount, but it lies between 2 and 2½ pounds of digestible protein daily. Of course, it is also necessary for the animal to have enough of the carbohydrates and fat, but these are almost without exception found in sufficient quantity in the foods produced on the farm. It can be readily seen then, that the most economical feeds for the farmer to buy, under usual conditions, are those feeds rich in protein in order to round out or balance the home grown or carbohydrate feeds. The most economical protein feeds vary with the different seasons and different markets, and every farmer can determine for himself by consulting the feed bulletins of the experiment station and the market reports what feeds it will be best for him to purchase.

The qualities of a good grain ration are:

First, it should contain approximately 2 pounds of protein.

Second, it should be bulky, not weighing over one pound to the quart.

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Third, it should not contain anything detrimental to the health of the animal. In making up a grain ration, the dairyman will need some dliuter to lighten up the more concentrated feeds. Wheat bran is generally used for this purpose, but is usually very expensive feed.

The Massachusetts Experiment Station recently carried out an experiment to see if it were not possible to feed a concentrated grain ration without the use of bran as a diluter. The grain ration used, consisted of 2½ lbs. corn meal, 2 lbs. of flour middlings and 1½ lbs. of cottonseed meal. This ration was mixed with the silage before feeding. The experiment proved successful and the cows went through the winter without trouble of any kind and did fully as well as when bran was used in the ration.

While it is perhaps well to understand and use the nutritive ratio in planning grain rations, it is not necessary. The coarse fodders fed will contain on the average, about 1 lb. of digestible protein. If the feeder figures on from 2 to 2½ lbs. of total protein in the grain ration, he will obtain the maximum protein requirement for milch cows. A grain mixture so prepared that 6 to 8 quarts would contain 2 to 2½ lbs. of protein would be excellent. The carbohydrates and fat will almost without exception, be present in sufficient amount. Occasionally starch is lacking. A possible case would be where cottonseed meal was used mixed with silage. The starch can be supplied by adding a little corn meal, hominy meal or flour middlings to the ration.

Never compare the feeding value of two different feeds measure for measure. The nutritive value is always determined by weight and not by bulk. It is manifestly unfair to compare a quart of wheat bran with a quart of cottonseed meal which weighs three times as much.

What a farmer can raise is of first importance, as what is bought depends upon what can be grown. The farm is the "carbohydrate factory" and in most cases will produce enough of the carbohydrates. Exceptions may sometimes occur when it may be necessary to purchase some starch in form of corn or hominy meal or flour middlings, as well as necessary coarse fodders. In regard to the so-called mixed feed, adulterated with corn cobs, the various oat offals containing large quantities of hulls

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and other inferior feeds, the only advice that can be given is, do not be tempted to purchase them at any cost. The purchaser will do as well in the long run to buy straight unmixed by-products and meals. While some of the mixed proprietary feeds may have good feeding value, they are almost without exception, mixtures of low grade and high grade goods, the high grade material being added to sell the poorer. If these mixed goods contained nothing but good material, there would be no need of combining two or more products to sell the goods.

THE DAIRY COW, HER FEEDING AND CARE.

By B. WALKER MCKEEN, Fryeburg.

The great need of the dairy today is better bred and better fed dairy cows. Too many of us have been content to live in the shadow of the past, and have neglected to admit the light of progress. The cow has, or should have, two values, her producing value and her pedigree value. These values should go hand in hand. Without the former, she is a failure; without the latter, she is a misfit. But few dairymen fully understand these conditions, and to them the production of today is all sufficient. If the dairy is to be preserved, if our cows are not to gradually diminish in numbers, more heifers must be raised. The supply is not equal to the demand. Still a poorly bred year-old heifer, one with no pedigree value, will not bring so much money as a good veal calf. This fact should set us all to thinking seriously, and serve to start us along the road of breeding in such lines, and from such animals, as shall not only keep our numbers good, but shall raise the individual value of the herd with each succeeding generation. If we would know that our advance is sure, a standard of performance for heifers with their first calves must be set, and rigidly adhered to by rejecting all that do not reach it. The sacrifices may be many at first, but will grow less with each generation, if the foundation stock has merit.

The young animal must have certain conditions surrounding her, if she is to rival, or excel, her dam. She must be fed liberally from the start, not with heavy concentrates but with

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food rich in bone and muscle making material, and containing plenty of bulk and organic matter. The corn field can be made to furnish the larger part of this feed. Oats, the clovers, and wheat bran will fill the bill for the remainder. By shortening the rotation, increasing tillage, and applying farm manures economically, the fodder crops of the farm will be increased, their variety widened, and their quality improved. Then in the case of the heifer, nature's laws should govern. Plenty of light, air and exercise must be given. The man who renews his herd with heifers kept in close confinement, and away from nature's sunlight and fresh air, will find it constantly losing in vitality, and in producing and reproductive powers. The lungs and heart must be developed by plenty of pure air and exercise, which at the same time increases the appetite. Then the digestive functions must be developed by plenty of nutritious roughage, with roots and grain to balance it.

Early maturity leads to premature decay, therefore do not breed the heifer till she has attained sufficient maturity to enable her to maintain her own physical powers and at the same time produce vigorous young. The size of vegetables and cereals is lessened as their period of maturing is lessened, through the selection of the earliest seed. The size of any breed of animals will be lessened by the breeding of the females at an immature age, and if early maturity is encouraged, the decadence will be the more rapid and sure.

We now come to the feeding and care of the cow, in the working dairy. Conditions have changed. The animal has begun its life work. Its value is measured by its productive capacity, and this capacity is increased as the comfort of the cow is studied. Here, we must have light, warmth, good air but closer quarters. She has grown in the open, with exercise extending her capacity and developing her usefulness; now as she begins her life work, all unfavorable influences are removed, and her whole surplus strength and energy go into production.

In selecting foods, the home grown products should be made to form as large a proportion as possible. *Abundance, variety and succulence form the trinity of successful dairy feeding everywhere.* Abundant feeding every day in the year with those feeds best adapted to the condition of the cow, must be

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the infallible rule. We are feeding, not for present results alone, but for the development of the calf that some day is to take the place of the dam. The saying that a calf well born is half raised is eminently true, and no calf can be well born from a mother that is underfed while she is carrying it. The danger of this is greater among the dairy breeds because of their inherent quality of throwing off the surplus food in milk. Those foods rich in bone and muscle building elements should form the larger part of the ration at this time, and succulent foods should never be lacking. The tendency now is toward a longer period of rest at the close of each milking season, thus giving the cow a better opportunity to build up her energies and more fully nourish the calf.

That the food should be reasonably balanced we are all well aware, but scientific research now appears to warrant the assertion that it is probable that by widening the ration and using a larger proportion of home grown starch foods, and thus encouraging the growth of the clovers and protein coarse fodders, we may add materially to the stock carrying capacity of the farm, lessen the initial cost of our food and promote the health of our animals. That succulence and palatability form a large share of the value of our coarse foods we have only to point to pasture grasses, silage and roots to prove. Clover hay does not differ materially in the proportions of its constituents from pasture grass, but the animal soon tires of it, if fed alone, and will not eat enough for best results, while corn silage or corn green from the field, with their wide nutritive ratio, are eaten in maximum quantities, and with great relish, for long periods, with good effects upon the animal and good results at the pail.

The dairyman should not study the proper balancing of his rations less, but should study to increase the quantity and improve the quality of his home grown foods more. The true province of the farm is the production of food, and any system of farming that does not take this into account will not stand the test of time. Our dairy farms should have less old fields. Every acre should be brought up to a full production. Through a judicious system of rotation this will be accomplished, and our cows will be fed better and at less expense. Corn should form the basis of the rotation, whenever possible. It is a large pro-

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ducer of food nutrients. No other New England fodder plant can compete with it. Its cultivation promotes tillage. It use increases the quantity and improves the quality of the milk and butter, and aids materially in sustaining the cow. It is very fully and easily digested. It is 26 per cent more digestible than timothy hay. Taking this as a basis it will require five and two-thirds tons of timothy to equal the digestible matter in an acre of corn, of the larger varieties. Corn is a soil renovator. It grows fastest through the hottest days of summer, when the unlocking of plant food is most rapid. Let us all remember that we shall never reach a high per acre production of foods with only 18 per cent of our arable land under the plow. The average dairy farmer is yet fully unaware of the great capacity for food production lying dormant in his land. He avoids labor with plow and tillage implement, leaving the bulk of his land in old fields, and rushes to the market to purchase the high priced by-products of his more enterprising brother, the manufacturer. Instead of this, he should see to it that the largest possible proportion of his farm is in some crop that has large food producing powers and that will yield a good proportion of protein; that all his harvesting is done at a time when each plant produces its smallest amount of indigestible woody fibre, and its largest amount of digestibility and succulence. Early cut hay is essential, both as a feed and as a means of renewing the soil. Where early cutting is practiced, the growth of clover is stimulated, the second cutting is increased, and the soil is kept more open and porous.

Clover will come second to corn as a feed for the cow. It thrives best on the actively tilled land on which corn has been grown. It is rich in protein, and when fed with corn forms a highly digestible and very palatable ration. By its beneficial effects upon the soil it increases the growth of those plants that follow it. The help in this direction, when combined with active tillage, forms no small proportion of its total value. Corn, clover, oats, early cut hay, roots and vegetables in their season, with such of the higher concentrates as may be deemed necessary, will furnish the abundance and variety. Corn, through the silo, will largely furnish the succulence. Except in the most northern portions of New England, the silo is essential to the successful feeding of the dairy cow. It has a place

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for use in summer, as well as in winter. It is an economizer of labor, of food nutrients, and of barn space. A given amount of feeding value can be stored cheaper, in less space, and with less loss of food nutrients, in the silo than in any other manner, the grains only excepted. Silage is soon to supplant soiling crops as an aid to pastures, and instead of planning for a rotation of these crops, to carry the cows through the last months of summer, the feeder will simply increase his acreage in corn, add to his silo capacity, and thus prepare himself with a constant supply of succulent feed, ready at his hand for feeding, without risk of barren places between the rotation of soiling crops, the loss from feeding them immature or over ripe, and the discomfort and inconvenience of exposure to storms.

The care and attention necessary to the successful feeding of the dairy cow are constant and exacting, and unless dairy intelligence governs every act, loss and dissatisfaction will most surely result; but as the dairyman emancipates himself from the grasp of ignorance and emerges into the light of intelligence, he will find this care and attention yielding him returns more commensurate with the labor and risk involved than any other line of stock feeding, and at the same time yielding him much of those higher attributes of the farm, social standing and privileges and the comforts of the farm home.

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THE LESSONS OF THE YEAR.

By D. H. KNOWLTON, Farmington.

Year after year the fact that Maine can grow the best of fruit is shown at the various fairs held in the State, as well as by the fine fruit one may find in the larger markets bearing the imprint "Maine Apples." A practical question that presses upon the fruit growers of Maine is this—What does the experience of the year teach us? It is the interpretation of the year's teaching to which we now devote ourselves.

GROW WHAT THE MARKET WANTS.

The most important thing, if there is such, is to find out what the market wants in the way of fruit and then grow it. There are some of us who feel that our own favorites are the fruits that people should call for, and we have hard work to understand that so far as the market goes it does not matter what the growers' likes and dislikes in varieties may be. It is entirely proper to raise for your own use the varieties you like the best, but when you are raising apples to sell you must raise what the buyer is looking for. This calls for all the more care, because all buyers do not want the same variety. A variety popular in one market will find few purchasers in another market. The Northern Spy, properly handled, is one of the best selling apples in the Boston market and we do not recall any instance in the English market when these prices have been equalled. The Yellow Bellflower, one of the best apples we can grow, will command a high price in some of the Middle and Western States, but it is not considered a desirable apple to send abroad. It is not that the apple is not just as good when it reaches the English market, it is rather that the consumers there want something else. So, then, it is for the grower to find out what kinds will be most profitable for him to raise, and which of these are the fruits that he can place to the best advantage in his markets, wherever they may be. In determining this he must consider his own location, for not on all farms can all of these be grown. In this he cannot trust the man who is trying to sell him fruit trees. Today the fruit growers of the State are paying dearly

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for such advice and the end is not yet. On the other hand if advice is in order, we would say consult the best Maine fruit growers and follow their advice.

GROW LARGER AND BETTER FRUIT.

The past season, as all are aware, the fruit generally was very small. It is this perhaps more than anything else at this particular time that calls attention to the desirability of growing larger and better fruit. In a season like this fruit does not grow as large as in ordinary years. This is no fault of the grower. The market calls for large fruit and it calls for perfect fruit, and the secret of reaching the best results is to produce this kind of fruit. One grower last year said to the writer, that he purposed to let the Almighty do most of his orcharding, but we are quite sure he was responsible for the disastrous results that followed and not the Almighty. Too many growers feel the same way. They plant the trees and give them a good start, we will say, and then trust in Providence. During the summer we saw a beautiful orchard of 300 trees that had been set and well cared for a couple of years. The caterpillars and grasshoppers came and the man who trusted in Providence lost all he had put into that orchard that was so promising but a few weeks before. The curse pronounced in the garden of Eden, seems to come in here: "In the sweat of thy face shalt thou eat bread." We have sometimes called the ordinary interpretation of this in question since the curse only seems a blessing in disguise, as the good Father has given us all the conditions to make our homes veritable paradises, and he who will may read the lesson and enjoy the fruits thereof.

MAKE THE ORCHARD MORE PRODUCTIVE.

The making of the orchard more productive involves no more than many of our fruit growers are now doing. It is interesting to know just how to do this to the best advantage, when labor and fertilizers are such expensive commodities. One of the handsomest orchards we visited during the year had been set ten years on a pasture hillside. No fertilizers at all had been applied save the mulching of ferns and grass that the land produced. The orchard was thrifty and beautiful and bore about 700 barrels of fruit.

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Another orchard visited had been pastured by sheep and the grass was closely eaten, hardly enough left to show the turf, but the fruit was fine and so were the trees. In other cases the hogs have done good work, and the growers find it a very inexpensive way of fertilizing the orchard. The hogs and sheep not only fertilize the land, but they eat up the wormy apples as fast as they fall from the trees, thus destroying a great many pests. It may be said that the hogs do more than the sheep, for they keep their snouts busy tearing up the turf, thus stirring the soil and in doing so find more or less injurious insects which they greedily devour.

Perhaps there is no better fertilizer than that made about the barnyard. The evidence of this is seen in many of the most productive orchards in the State. It is probably true that the free use of this may encourage the growth of fungous diseases, but it makes the trees grow and gives large fruit. The only question as to its use is that the farm usually needs it somewhere else more if possible, and in a cheaper way the necessary fertilizers may be supplied.

Another method is the use of cover crops, but there is need of something to make the cover-crops grow, so that the whole matter seems to be summed up in this: Make the orchard grow, but do it by whichever method may be most economical. This gives something for the grower to think about evenings as well as something to read up on and investigate. The orchard speaks plainly enough as to its wants if some of the time is spent in asking it questions, and carefully examined, it will not deceive its owner.

INSECT AND FUNGOUS ENEMIES MUST BE SUBDUED.

We regret to note that as yet very little thorough work in spraying has been done by fruit growers in Maine. It has been so easy to let the orchard grow as it may, trusting to the Almighty to make it productive, that it is a wonder that there has been so much good fruit. In most orchards examined by the department inspectors many injurious insects were found and traces of fungi were conspicuous. In one orchard, a fine Milding orchard, the trees were looking fine. They had been sprayed twice, but so far as we could examine the fruit we did

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not find a specimen that was free from scab. The appearances here indicated that there was neglect in not spraying early enough. Another orchard in a different part of the State had not been sprayed at all. The owner said if he had thoroughly sprayed his trees it would have saved him $300. While the scab in many cases did not show very plainly when the fruit was picked and stored it later developed to such a degree, that many barrels were ruined for market. Carefully conducted experiments indicate positively that both insects and fungi may be controlled by thorough spraying with insecticides and fungicides combined. It must be done well and done at the right time. All indications point to this course as a necessity if we are to raise the best fruit in the future.

The conclusion of the whole matter seems to be that we must raise better fruit, and the sooner every grower looks at it from this point of view the sooner he will be in position to make his orchards pay him big profits. The production of better fruit is the first part, the selling of it is the other part. It must be well packed and carefully graded. We sincerely hope it may not be found necessary to enact a law to make the growers do what every honest man ought to be glad to do—pack his fruit honestly.

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MAINE FARMER PRESS, AUGUSTA

Hereford Calf, Perfection Fairfax 5th, No 265421

Sired by Perfection Fairfax, champion bull at the International Exposition, 1907. Owned by D. H. Tingley and Son, Readfield

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THE CARE AND HANDLING OF MILK.

By S. C. THOMPSON, Winterport.

Much has been written and said about the care of milk, with the idea of retaining its quality by preventing contamination, thus making it more wholesome and less liable to cause illness among the large number of infants and invalids as well as all others who use it, and also that a better class of cream, butter and cheese may be made from it. We all realize that certain changes take place in milk, though we seldom know or even care what causes those changes and some even positively object to discussing the cause.

It seems to me that we can not know too much about this important subject, since it affects the quality of our product and the quality is the one essential which governs price and establishes our reputation, whether it be for milk, sweet cream, butter or cheese.

Our established reputation in New England for sweet cream has come from our ability to produce a better quality than our neighbors produce. There is a reason for this, and the more that we know about this reason, the more easily we can maintain or improve the quality and thereby continue our present standing at the head of this important branch of dairying. The same thing is true of our milk and butter. If we wish to make for ourselves a reputation and sustain it as we have for cream, we must produce a superior product, which can only be done by knowing what conditions we must have to produce the best quality and how to control the changes in order to secure the desirable conditions and avoid those that are undesirable. For to the operator with the most knowledge, who has the ability to execute it, come best results and superior quality; so in the community where thought and study are applied to the greatest degree, will the product average highest; in the State in which this knowledge is disseminated to the greatest number and where the most people are interested and striving to know the most and the whole, will the reputation for producing the best product be found. Therefore, I believe the time has come when all

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dairymen should know what is the cause of the changes in milk, how they come about and how they may be controlled.

Milk when first drawn from the cow is nearly sterile, or contains practically nothing which causes fermentations or changes. The change with which we are most familiar is souring, though there are many others, some of which we are more or less familiar with. These changes are caused by the introduction into the milk after it is drawn, of various vegetable organisms called germs, ferments or bacteria. These germs first attack the milk sugar and convert it into acid; later the albuminoids are attacked and last of all, the fats. The change takes place in a very short time after the milk is drawn unless something is done to prevent it and rapidly continues until the milk becomes unfit for food. Milk being a solution and containing suitable food for the germs, makes a most admirable place for their development so long as the temperature remains the same as when drawn, or even when allowed to cool to summer heat.

Germs are found in almost everything, in great numbers except in the healthy living tissue of plants and animals, and are so small that it requires a powerful microscope to see them; they are so light and numerous that they are floating about in the atmosphere, especially on particles of dust, by which means they may gain access to the milk.

The cow stable is usually filled with them, coming especially from the dusty hay and straw or cobwebs, hairs and particles of manure, so that milk in a dusty or dirty stable has become heavily contaminated before the milking process is through and the longer it remains in the stable, the greater is the infection. At the temperature of the freshly drawn milk they multiply very rapidly, doubling in about twenty minutes, thus causing a rapid change in the milk which is so noticeable in warm weather if milk is not cooled.

Most germs are harmless except as they cause changes in the milk, which render it unfit for food, though there is a class that are disease producing, such as typhoid, diphtheria, tuberculosis, etc., but this class must be conveyed from the disease itself and are not floating about except the disease is present nearby.

Water used in washing milk utensils, is often a source of infecting milk with disease germs.

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The usual sources of milk contamination are dust floating in the atmosphere, hairs and dust falling from the cow during milking or particles of dirt and manure which often cling to the flanks of the cows, dirty pails and improperly scalded utensils and dirty hands and clothing of the milker.

These fermentations exert a powerful influence upon the milk and also upon the products made from it. They may be controlled in the following ways: First, by preventing the infection, which can be done by having the stable clean and the air free from dust at milking time; by wiping the cow's udder and belly with a damp cloth just before milking, and keeping the flanks free from manure; by avoiding the feeding of hay or other dry forage at or just before milking time; by using properly washed and thoroughly scalded utensils, having the seams well flushed with solder, kept in a place secure from floating dust and washed with pure water; and lastly, by the milker having clean hands and clothes and being free from every contagious disease. Milk drawn in this way will keep free from changes twenty to twenty-four hours longer than when these precautions are not taken.

Second, by preventing the growth of germs in the milk after the infection. The germs do not grow or thrive at a low temperature and if milk is cooled quickly and thoroughly to 45 degrees F. or less, but little fermentation can take place and milk kept in this way will remain sweet for many hours and often several days longer than when the temperature is sufficiently high to allow growth.

At this low temperature however, after a time, a bitter or salty taste may develop, due to the fact that some germs are present, which develop and cause this condition at a low temperature.

The fewer germs in the milk, the more effective will this means of prevention be, but in all cases, it is a powerful check and the principal means of controlling fermentations.

Germs in milk may be killed by using certain chemicals known as preservatives, all of which are more or less injurious to human health and are prohibited by law in Maine and most other states.

They may also be killed by an application of heat. When a temperature of 212 degrees F. is reached, the milk is said to be

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sterilized, though it must be maintained for some time or for stated periods at intervals of several hours. The application of 160 to 185 degrees F. is called pasteurizing and will kill the greater part of the growing germs. This means of killing germs is seldom used for market milk and is unnecessary, if proper care is exercised to prevent and control infection, but for cream which is shipped long distances to market and is not consumed for several days after reaching it, this means is very generally employed, though by the exercise of proper cleanliness and sufficient cooling, individuals are able to produce and market cream, without employing artificial means, which will keep for two weeks or more in an apparently perfect condition.

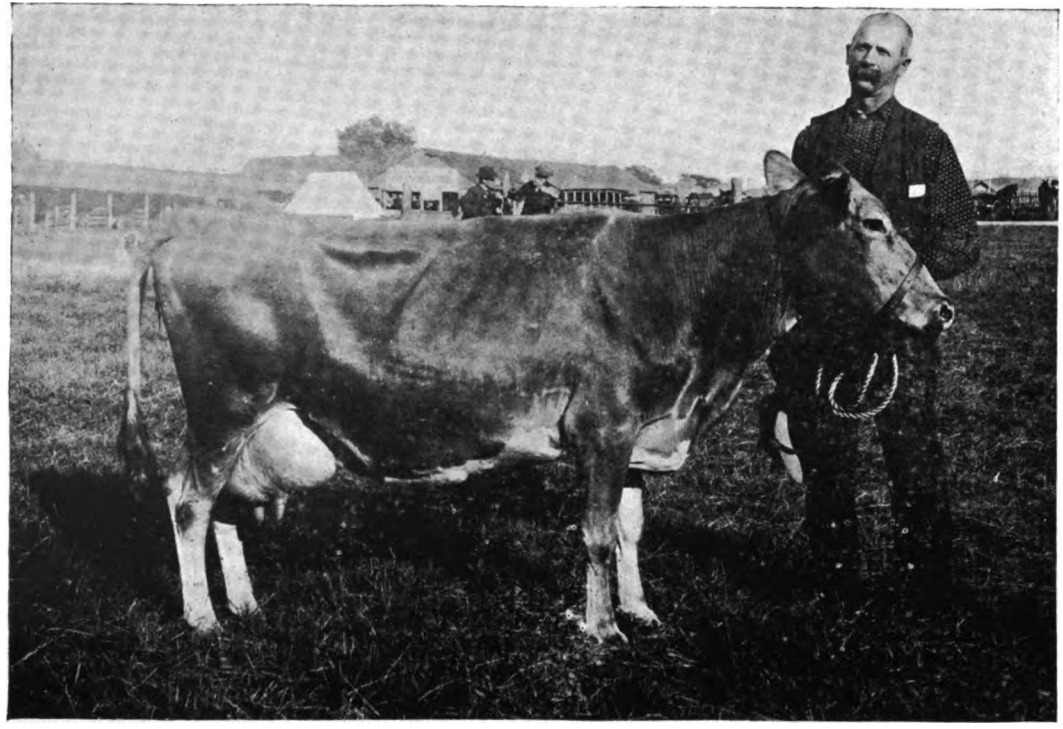
In the manufacture of butter, it is equally necessary to control the fermentation until the operator is ready for the ripening or souring to take place, when he will introduce certain kinds of germs which have been found to produce souring or what the butter-maker calls ripening.

Thus we see that it is necessary to prevent all fermentation in market milk or cream or in cream intended for butter making until the butter-maker is ready to ripen for churning, when he must know what fermentation is to take place and be able to control it, that it shall not proceed too far and produce a rancid or otherwise disagreeable flavor. The ripening process also affects the grain and texture of the butter by rendering the cream more easily churnable, thus assisting the operator with his many difficult problems.

We can see that the ferment plays an important part in all milk, cream and butter production and when the greatest number of interested people study the cause and control of this important factor in dairy work then will the best product be generally made. No one should object to knowing the truth and the whole truth, when by so doing, he will better understand the underlying principles in this important matter and be better able to place on the market a superior product for which a profitable price can always be obtained with a greater satisfaction to the producer.

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MAINE FARMER PRESS, AUGUSTA

Guernsey Cow, Myrtle of Elmwood, No. 12317, owned by John F. Buker, Bowdoin

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REPORT OF PROCEEDINGS

OF THE

State Dairy Conference

AND

TENTH ANNUAL MEETING

OF THE

MAINE DAIRYMEN'S ASSOCIATION,

DECEMBER 3, 4, 5, 1907.

The annual State Dairy Conference was held at I. O. O. F. Hall, Auburn, Tuesday, Wednesday and Thursday, December 3, 4 and 5.

Tuesday evening, December 3, the meeting was called to order by F. S. Adams, president Maine Dairymen's Association, at 7.30 o'clock. Prayer was offered by Rev. J. T. Crosby, Auburn.

ADDRESS OF WELCOME.

By Prof. L. C. BATEMAN, Lewiston.

When I came home from the city of Hartford the other day I found lying on my table the program of this conference, and I then discovered for the first time that I was down for an address of welcome. It did not disturb me in the least, because I knew that whatever I might say, whatever terms of hospitality I might make, the citizens of Auburn, "Loveliest city of the plain," would stand behind me. I knew that I was to talk to

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representatives of the homes of Maine, the country homes, the love of which in all ages has been one of the strongest sentiments of the human heart. Some of our finest poems have been on that subject. How those immortal lines recur to the mind, "How dear to this heart are the scenes of my childhood, when fond recollection presents them to view!" In every age of civilization the tenderest thoughts of humanity have centered around the word home. To say that agriculture is the basis of all our national prosperity would be simply to repeat a truism. But sweeter, grander and nobler than all material wealth are those tendrils of affection that ever cling around the home of our childhood days. The poet never sings of the city, he never sings of the palaces of the rich; it is the vine clad cottage by the sea, or some country home in some wooded dale.

I am here this evening to say a word of welcome to you who represent the happy homes of Maine. You are also representatives of the great dairy interests of this State. Dairying is today simply in its infancy. I remember when a boy, and some of you older ones can easily remember, the old barn with its great cracks, the scrub cow, the old milking stool. But a wonderful change has come as the years have passed by. Today we find the blooded cow; today we find a better barn, a better house. We find the barn shingled or clapboarded and painted, and a neatly kept lawn around the buildings. Everything has been progressing and advancing with giant strides since you and I were boys, and I believe the future will see as great an advance in this industry. Year by year the great army of tourists to our State is increasing, and the time is coming when every acre in the State of Maine will be taxed to its utmost to provide for our summer guests. Do you realize that there are 1,700 miles of coast line in the State of Maine? We have also over one thousand lakes, and countless rivers and waterfalls, and majestic primeval forests. This State is to be the great playground of the American Nation. In this line alone there is a great prospect for the dairy industry of the State. Prosperity is certain to come in ever increasing volume as the years roll on.

As I look over this audience of intelligent yoemanry, there comes to my mind as if wafted across the rolling seas from the far land of Bonny Doon the lines of Sir Walter Scott:

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"Breathes there the man with soul so dead
Who never to himself hath said
This is my own, my native land."

The motive which actuated the poet who uttered and penned those lines was undoubtedly that of sincere patriotism to his own country and admiration of the Anglo Saxon race. Wherever that race have planted their feet they have established order, encouraged industry, built up commerce, created wealth and enthused the ideas of modern civilization into the sluggish populations by which they were surrounded. It is thus that the countries of the Old World have grown quite as much abroad as at home, and it has been their principal boast in the past that they have been overshadowed by their own colonies which have diffused their arts, their language and their civilization over every continent and into the isles of the most distant seas. You are the descendants of those pioneers. In your veins flows the blood that established all of the public institutions which have made our boasted civilization what it is. You represent 60,000 happy homes. Many thousand young men and young women have gone out from the State of Maine to enrich other states. We have furnished great statesmen, governors, senators, orators, leaders in society, leaders in public life, in almost every state in this broad land. We have nothing to regret; we have simply contributed from our abundance, and we believe many of the sons and daughters of these men will return to the old homesteads as the surest road to success.

We have heard of the abandoned farms of Maine, and I am sorry to say that in many of our coast towns the population has decreased. But I believe the time is near at hand when every one of those places will be restored. The next 20 years will see a great increase in the dairy industry, in the poultry industry, in everything connected with agriculture; it will see, instead of 60,000 happy homes, many, many more. The tide is already turning from the cities to the country. Here is to be the future Eldorado of this country, and to you and to your posterity will come a prosperity undreamed of today. The farmers of Maine are worthy of their destiny. I hail you as the morality, the intelligence and the salvation of our State and of our Nation.

If I have said anything tonight that may seem to be extravagant, if I have said any words of praise that may seem too

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strong, remember that the utterances of sincerity have ever been permitted to the voice of friendship. The city of Auburn opens wide her gates, and in the name of every citizen I bid you a cordial welcome to our hearthstones and our hearts.

RESPONSE.

By W. G. HUNTON, Readfield.

I am pleased to accept the hospitality of this city, which has been so heartily and poetically extended to us, in behalf of the Maine Dairymen's Association. And I wish to say to Brother Bateman right here that we farmers feel ourselves perfectly able to stand all the prosperity which he has predicted for us in the future.

I think that we have met here at this time under most propitious circumstances. We have tasted before of the hospitality of the city of Auburn, and we know how good it is. We have left our barns filled to the ridge poles with proper feed for the cows, and we have the promise and the expectation of a good demand for our product the coming winter at renumerative prices. We have looked forward to this meeting for a year, and we have come, I have no doubt, to make the most of it, to get all the instruction and enjoyment we can. This branch of agriculture in the State of Maine has been, perhaps, one of the latest branches to recognize that great business principle which all other trades and professions have long since recognized, that of banding themselves together, by the interchange of ideas and experience to strengthen themselves in the particular work in which they are engaged. The different products of our dairies have advanced in the last two decades from a luxury to a necessity, and with this advance has been a corresponding and rightful demand for a cleaner and better product at better prices. We farmers now recognize that we must find out by the shortest cut possible how to furnish that product as the consumer wants it. It takes us too long to learn by our own experience.

We must call to our aid the laboratory and the assistance of scientific men, to show us the whys and wherefores of our busi-

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ness without studying them out ourselves. It is for that reason that these meetings have been prolific of so much good, and it is for that reason that we have called here to this meeting Prof. Beach, Prof. Hills, Dr. Smead, Dr. Whitaker and other men who have made a special study on special lines of our work. We expect them to tell us those principles which govern and control our business that we may take them home and immediately begin to profit by what we have learned, and thus increase our income. These are some of the motives which have led us to leave those pleasant homes that have been so feelingly spoken of,—and they *are* pleasant homes, the farm homes of Maine, the pleasantest of any in this country. These are the mercenary principles which have led us to leave those pleasant homes and partake of your hospitality; and then, beyond all this, there is a principle which should govern every true man today, that great moral principle of leaving for the next generation something better than he has had himself. Our fathers left us better cows, better tilled farms with which to pursue our business than were left them by their fathers. It is a moral obligation that we leave to the next generation better cows, better tilled acres and better products from our dairies. Rev. Edward Everett Hale never pronounced a greater truism than when he said, "The greatest gift of man is today." There are more people today enjoying the gifts that God has bestowed upon us than there ever were before. They are entitled today to better homes and better things than they were yesterday. Progression should follow every man from the cradle to the grave and throughout the rounds of Eternity. It is that spirit, coupled with the spirit of gain which induces us to make our best endeavors in any profession, that should bind us together at this meeting, and make us ready to go forth and use any ideas we are able to take from the meeting in our own business and preach them to those around us who are engaged in the same lines.

We thank you again for the hospitality extended to us. We will endeavor to deserve it. We will endeavor to show in the next year that we have profited by what we have received here. We will make this meeting a banner meeting of the Maine Dairymen's Association.

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HOW TO LESSEN THE COST OF PRODUCING A POUND OF BUTTER FAT.

By Prof. C. L. Beach, Burlington, Vt.

Specialized dairying has recently celebrated her Golden Jubilee, her fiftieth anniversary, as we might say. I refer to the national dairy exhibit at Chicago in October. It was a very interesting and profitable exhibit for one to study. All the appliances which are used in the handling of milk and the manufacture of butter were on exhibition; all kinds of separators, combined churns and workers, cream ripeners, starter cans, all sorts of appliances for bottling, sterilizing and pasteurizing milk,—everything one could think of to use in any way in the creamery or the farm dairy, or in the care of dairy cattle. On the other side of the exhibit were 600 dairy cattle, some of the finest animals which exist in this country. It was a wonderful exhibit, and I can imagine that an elderly man, or even a middle aged dairyman who reviewed that exhibit, might have said to himself, perhaps rather thoughtfully and sorrowfully, something like this: If I could have had these opportunities when I started out in life, I might have made more of a success. And there is some truth in that, too, because the most of those appliances have been invented in the last 10 or 15 or 20 years. And I can imagine that a young man who is just starting out might have looked upon it in a different way and said to himself, If I am to make a success, if I am to make a profitable business out of dairying, I must take advantage of all these opportunities, I must have the best appliances for the handling of milk and for its manufacture. I must have better cows. And I think a young man who viewed that exhibit would go away with new hope. The exhibit was, then, an epitome of the great progress which has taken place in dairying in the last forty or fifty years. It was also prophetic of the great advance which is to take place in the near future. It might be well to recall the conditions which have brought about this development. I think there are four conditions, and they are operative today. The first is the application of co-operation in the manufacture of dairy products. The second is education: First, of the investigational

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kind, the work of our experiment stations in the analysis of feeds, in digestion trials and feeding experiments; second, of the constructive kind, the work of the agricultural college, the dairy school, the dairy paper and the farmers' institute. The third is the results following the inventive genius of men who have applied their ideas and thoughts to dairy conditions, giving us the farm separator, the Babcock test, the milking machine, the silo, all the different appliances which we ought to have in an up-to-date barn; and the fourth condition, which it seems to me has had a great influence, is the importation and the spread of pure bred dairy cattle.

Now these four conditions are operative today and they will continue to be operative in the future. But there is another phase of the problem receiving much attention which relates to the economy of production.

The man who has made two blades of grass grow where one grew before has been looked upon as a public benefactor. But the man who has produced the one blade at less cost is worthy of recognition. Heretofore the dairyman has sought increased profits in larger output. I would like to direct your attention to the possibilities of increased profits resulting from a more economical production. There are four topics which I wish to touch upon—viz., the selection of the cow, the feed, the care of the dairy animal and breeding.

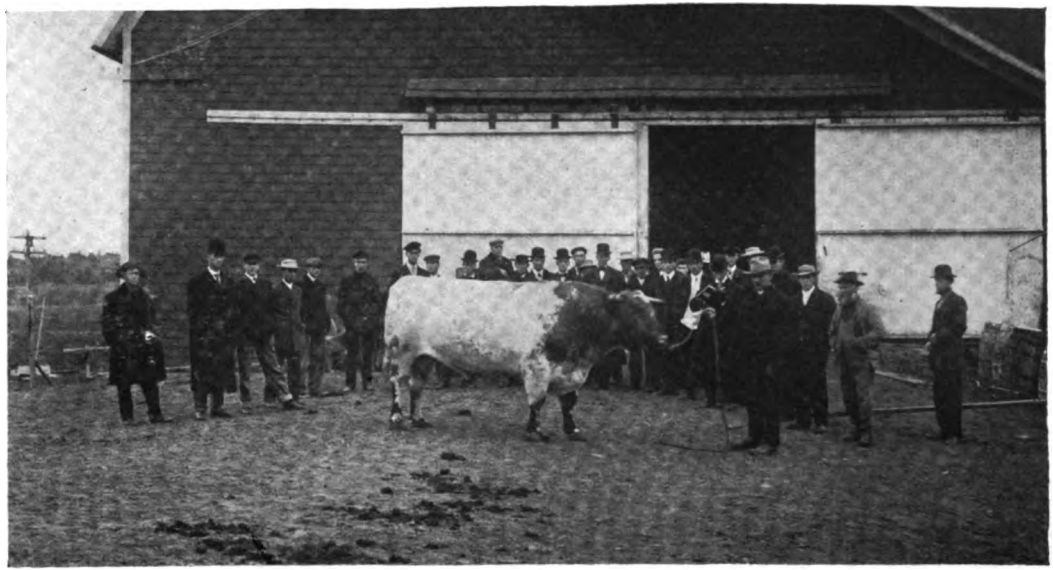
There are four recognized dairy breeds of cattle. I presume there are some here who are interested in Jersey cattle, some in Holstein, and others in Ayrshire or Guernsey cattle. Yet I think there is something to be said in regard to breed as affecting economy of production. If you should go to a breeders' meeting and hear the breeders talk, you would think there was no breed except the one in which they were particularly interested. I attended a Guernsey breeders' meeting in Chicago the other day, and they talked about the golden color of the milk, the butter and the skin of the Guernsey cow, her wonderful capacity for milk production, her beef qualities even. The breeders seem to be infected with the germ of enthusiasm about their particular breed, and it is well they are. I like to see it because one must think well of a breed, believe in it and love it, if that breed is to do its best for one. But there is just one thought I want to present about these four breeds of cattle.

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Two of them, the Jerseys and the Guernseys, have been bred for centuries for economic butter production; and the Ayrshire and the Holstein have been bred for a large milk flow. This selection and breeding has resulted in various breed characteristics one of which is a difference in composition and in the proportion of fat to solids not fat in the milk. In the St. Louis dairy test the milk of the Jersey herd contained 1.87 pound of solids not fat to each pound of fat, the milk of the Holstein herd contained 2.3 pounds of solids not fat to each pound of fat.

Now what do these figures mean? The Jersey and Guernsey cows have a certain advantage because of the character of their milk for economical production of butter fat. The Holstein and Ayrshire have a certain handicap because for each pound of fat produced more solids not fat are elaborated in the milk. That is a particular characteristic of the breeds, and it seems to me that the Jersey and the Guernsey have a certain advantage in the line of economic production of butter and butter fat. I am not a breed fancier. In another place, I would say just as much for the Ayrshire and Holstein. I think they can produce milk solids more economically and in certain ways are better fitted for the production of market milk. Outside of the breed there are great differences in individual cows, as we all realize. In fact, there are greater differences than between the breeds themselves. That subject has been brought to your attention a great many times, and I do not expect to say anything new upon it. I do not know as I can put it in any different way than it it has been put to you a great many times, but here is one of the stumbling blocks in the management of the dairy business of today. We keep too many cows. We do not know what they do. Some of them are good cows, some of them are poor ones, and it takes the profit of the good cow to balance the loss from the poor ones. Now it is difficult to say what is the real difference in the dairy capacity of cows. It is not so much in the amount of food they eat; the true difference seems to be in the ease or manner in which they convert the digested food into milk products. Take the cows Rose and Nora of the Illinois Experiment Station. They were kept in a barn for the year and the exact record was kept of all food consumed. Rose consumed 6,477 pounds of digestible nutrients and produced 658 pounds of butter. Nora consumed 6,189 pounds of nutri-

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Students from Agricultural Department, University of Maine, Orono, inspecting Shorthorn Bull, Duke of Lookout, No. 202429, property of Hopkins Brothers, Fort Fairfield

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ents and produced 348 pounds of butter. Rose produced nearly twice as much butter as Nora from practically the same amount of food. The difference, therefore, was not in digestive capacity but in the ability of Rose to convert the food more easily into milk, milk solids or butter fat.

Here on the charts are illustrations which are taken from the Storrs College herd. I have grouped the five best cows in the herd and the five poorest together. The five best cows in the year 1899 ate $56.54 worth of food per cow and the five poorest cows ate $52.02 worth of food. The difference in the value of the amount of food eaten by the best and the poorest cows was $4.52 each, and the difference in the net profit was $31. The five best cows made a profit of $26.91 each, and the five poorest a loss of $4.09 each. Now the difference is in the way the cow converts the food into milk. This difference in assimilation is illustrated in the human family. Here is a man who perhaps could go out and cut two cords of wood in a day. I do not suppose I could cut two cords of wood in a week. I haven't the skill; I do not know how to handle an axe. The horse that can trot a mile in two minutes does not eat any different food, or any more of it, perhaps, than the horse that trots in three minutes. It is the ease, or skill, or cleverness—whatever you may call it—with which the food is utilized for the different purposes. That principle holds with the cow. This same record runs through five years. Of course the five poorest cows were eliminated at the end of the first year. The next year the five best cows ate $60 worth of food and the five poorest $45 worth, a difference of fifteen dollars in the food eaten, and there was a difference of $49 in the net profit. There were five cows which had got into the herd in different ways, which were kept at a loss of $5.75 each. That is the thought I wish to bring to you, and Prof. Hills will emphasize that point tomorrow in his talk upon the need of cow test associations. I simply wish to point out that there are great differences in the productive capacity of cows, even in a college herd or an Experiment Station herd. And there is no reason to think that there are not as great differences in the ordinary working herd. The problem is to find out which are the least profitable, and we can only do that by keeping a record. Then we can eliminate the

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cows which do not show a profit, and attempt to replace them with better ones.

On another chart I have figures illustrating the same point, in the work of the St. Louis herds. The best Jersey cow in 120 days ate $32 worth of food and made $50 worth of profit. Another cow ate $30.24 worth of food, and made $23.30 worth of profit. The first cow ate $1.76 more of food and made $26.70 more profit. So you see that these differences exist in pure bred cattle. Compare the best Holstein cow at St. Louis, and one of the poorest. The difference in the amount of food eaten was $1.84, and the difference in the net profit was $28.

In our work at the Storrs Station, we tried to eliminate the poor cows, and I want to show you what weeding out the poor cows and replacing them with good ones will do. We did not raise our cows. We bought them, paying never more than $50. In 1899, they were making 284 pounds of butter each, and the food cost $54.25 for the year. They made a profit of $11.76 above the cost of food only. When we considered labor, interest and taxes, they made a net loss of $1.23 each. We figured labor at about 20 cents an hour, foods at the market price, interest at 5 per cent, and depreciation in the value of the cow; all the factors that would naturally enter into the problem. As the unprofitable cows were eliminated from year to year the production increased. You will notice, however, that the cost of food, which was made a uniform price for the five years, differed scarcely $2.00, and yet we went from $1.23 per cow on the wrong side to $21.69 net profit. That is simply the effect of keeping a record and weeding out cows. I hope you farmers in Maine will get interested in the cow testing associations. I do not quite see the necessity for an association in all cases. I do not see why any farmer cannot take up the work for himself in his own herd, weighing the milk and from time to time getting some one to make a Babcock test. But if you have not the time to do it or the courage to start out, join an association and let some one do it for you.

This difference in the productive capacity of cows is perhaps brought out more clearly in the figures at the bottom of the chart. Here are practically 100 cows, not 100 individuals exactly, but there are 103 lactation periods. The 20 best cows

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made a profit of $39.40 a year; the 20 which were second best made a profit of $21.96; the 20 third best, a profit of $14.62; the 20 fourth best, $5.67, and the 23 poorest made a loss of $13.07 each. The 20 best cows made a profit of $788, and the 83 remaining cows made a profit of $400, just about half.

Now it is the poor cows which are eating up the profits of the good ones. If you are to increase the profits of your herds, or decrease the cost of production, you must eliminate the cows which individually run you into debt.

In the second place, we must feed our cows more intelligently. That is a pretty hard proposition to put up to a dairyman at the present time. How are you going to feed so as to produce products more economically? Feeds are high in price, we say they are almost out of sight. The market price of our products is not in proportion, especially just at present, because on account of the financial depression the working classes are apparently not able to consume as much or to pay as much as they might have done if it had not been for the change in the financial situation. And so I say that under present conditions it is a pretty hard problem to tell you how to produce a pound of butter fat at less cost than you did last year.

A great deal of thought and study and investigation have been put upon the subject of feeding. The experiment stations have done a great deal of work in analyzing all of our cattle foods; they have made hundreds of analyses. They have carried on digestion experiments and countless feeding experiments. We have the experience and the practice of successful dairymen all over this country to draw from, but if I were to boil down, as it were, the present knowledge on the subject of economical feeding, I should express it in the form of maxims, of which there are practically five.

First, the more food you can get a cow to eat the greater the milk flow. I am speaking in general terms. A cow will not usually consume more food than she can digest properly. If we accept that principle and put it in practice, it simply means that we must make the ration of the cow as palatable as possible. In the first place, we must give her a variety, because a variety of foods is always more appetizing than a few foods. Silage or roots seem to be more appetizing and the cow will eat more

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of them than of dry fodder. Early cut hay, again, is more appetizing than late cut hay and the animal will be induced to eat more of it. That is the principle and you must apply it. Feed such foods, in a practical way, as will induce your animals to eat the most.

Second, the more easily digested the ration, the more the milk flow. Now a certain amount of the food which the cow eats, or the energy of it, is used in preparing that food for assimilation. In the coarse fodders it is perhaps a large per cent. Applying that principle, we see that pasture grass is more easily digested than dry fodders. We see again that succulent foods are more easily digested than dry fodder, that early cut hay is more easily digested than late cut, that grain or concentrates as compared with roughages are more easily digested. No one would expect to feed a driving horse on hay alone and get much speed out of him. For one thing, it taxes his digestive capacity too much to digest the food, and he has not energy and life enough to make a good roader. In the feeding of the dairy cow grains are more easily digested than coarser foods, and so we must expect to feed some grain; perhaps from a third to a half of the digestible nutrients in the form of concentrates.

The third proposition is this: The more protein you feed a cow up to a certain point, the larger the milk flow. In the first place, the cow cannot convert one element into another. She cannot change nitrogen, for example, into carbon, or hydrogen or oxygen. First, there is a demand by the cow for a certain amount of food which contains nitrogen to make the casein of the milk; in the second place, there is a call for a certain amount of nitrogenous food to maintain the body. And in excess of that, the addition of protein seems to stimulate milk production. So if you commence with a ration moderately wide, which contains a comparatively small amount of protein, as you increase the protein you increase the milk flow. The Germans have worked out a standard which seems to fit the average cow, and it calls for a pound and a quarter of protein for every ten or twelve pounds of milk.

The fourth principle or maxim is that the richer the ration the richer the manure. About 75 per cent of the nitrogenous matter of the food or ration, and 90 per cent of the mineral

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matter of the ration appear in the droppings of the animal. As you increase the ration in rich concentrates, rich in mineral matter and in nitrogen, the droppings of the animal increase in richness, and a part of the profit which comes from high feeding may be looked for in the manure pile. It may pay sometimes to feed a nitrogenous food even while there is very little increase in the milk flow.

These are four of the principles: The more food you can induce the cow to eat the more milk she will give; the more easily digested the ration, the more energy she will have for converting the food into milk and the more milk she will give; an increase in the protein of the ration is followed by an increase in the milk flow; the richer the ration in nitrogenous and mineral matter, the richer the manure.

These principles must all be modified by the 5th one, and that is, that maximum production is not always the most profitable. You must work out that factor for yourselves. Neither Prof. Woods, the professor of dairying at Orono, nor any dairy expert, I do not care who he is, can give you the most economical formula for feeding in any particular case. Conditions are so different with dairy herds. In the first place, you have different productive capacities in your cows, then your market prices for feeds and for products are different; so that no man, I do not care how well he understands the subject of feeding, can tell another off hand how he should feed his herd. Then, again, no two individuals in the herd can be fed in the same way with the same results. It seems to me you will each have to try that for yourselves and watch the milk flow, increasing the foods and the protein and stopping at the point where the increase yields the most profit.

Ques. Did you say that the standard was 1¼ pounds of protein to 10 or 12 of carbohydrates?

Ans. One and one-fourth pounds of protein to ten or twelve pounds of milk produced. The German standard calls for about .08 of a pound of protein for each pound of milk produced in addition to the ¾ pound required for maintenance.

We must select better cows, feed them more intelligently, and care for them better. In the first place we must keep our cows warm. Ordinarily I think enough heat is liberated in the body

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of the dairy animal to keep her warm without direct expense. We do not feed our cows to keep them warm; we feed them to produce milk, and in the production of that milk they liberate heat as a by-product which keeps them warm. But if we expose that animal by letting her out into the barnyard for exercise, as quite often is the practice of farmers, and leaving her out for several hours a day, we chill her, and in that case food may be burned directly to furnish heat and keep the cow warm, and as a result she shrinks in her milk flow. The dairy animal is different from the beef animal, which is a smooth, plump animal with a coating of fat around the body. Most farmers are better care takers of beef animals than dairy animals. The beef animal suffers no inconvenience when you turn it out in zero weather. The experience of feeders, and the results of carefully conducted experiments would seem to indicate that the fat steer will enjoy a temperature of 50 or even below. It is the fat which is around the body and the internal organs which acts as a blanket and keeps that animal warm. Such treatment will not do for the dairy animal. She has no fat on her body and suffers and shrinks in milk when exposed. Prof. Plumb has shown this very well in an experiment where he kept a few cows in the barn carefully protected and others exposed for a few hours each day. The experiment was continued 48 days and the cows exposed shrank an amount equivalent to six cents a day per cow. But when we attempt to keep animals warm we do not want to make the mistake of confining them in too close and improperly ventilated stables. The dairy cow breathes in about 2,800 cubic feet of air in a day. She breathes out in an hour 116 cubic feet of air. Of course we realize that air which has been once breathed is unfit for being taken into the lungs again, and in the human family, at least, the physician tells us that when air contains 3.3 per cent of expired air, it is impure and unwholesome. If compelled to breathe such air day after day you suffer from lowered vitality, have a headache, or feel languid. This comes from an insufficient supply of oxygen. It may not make any great difference this year, perhaps, whether you have a properly ventilated stable or not, but take it year after year and improper ventilation will tell on the vitality and health of the animal and in time upon its productive capability.

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The great problem in connection with the barn is to keep it warm and ventilate it too. If you open a window fresh air will enter but the temperature is lowered. The problem is to ventilate your stable and keep it warm at the same time. In our latitude we attempt to keep the stable warm by the heat which is given off by the animal bodies. The animal warms a certain amount of air just as a stove might warm a room and this warm air must be utilized to keep the stable at the proper temperature. The warm air is the lighter and rises to the ceiling while the cold air settles to the floor and with it the impurities. We want to preserve the warm air and get rid of the foul. That means that the air should be taken out near the bottom, and the air which enters the stable be taken in near the ceiling. The King system of ventilation is based upon this idea. The outlet flue has an opening near the floor, and the air which is drawn out is taken from near the bottom, which is the most impure and the coldest. This air is taken up to the roof of the barn and passed out through the cupola. I have another illustration where a special shute is built about two feet square, of tight lumber, with no cracks or places for the air to draw in. It should be built as you would build a chimney, and should go up above the peak of the barn, so that the air which blows across the top will help to create suction, and aid the ventilation. This chimney should be about two feet square for each twenty animals stabled. The fresh air is taken in between the sheathing and siding near the ground, and enters the stable near the ceiling. The idea is to build it so that the draft will never go the other way. The warm air will not fall. In this way you have a system that ensures ventilation, and it has been very successful. I believe this is a factor which the dairyman should consider when remodeling a barn or building a new one. Pure air is just as necessary to the cow as food. She uses it in much the same way. We ought also to provide sunlight for our cows. Our stables are altogether too dark. Sunlight is a tonic, an invigorator, to the human being, and certainly not less so to other animals.

There are three ways in which we may say that exercise is beneficial to animals. First, to give them fresh air; second, to get them out into the sunlight; and third, to stretch their muscles. If the stable is properly ventilated and lighted the two

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main reasons which farmers assign for exercise are eliminated. Then the question is, How much must we let the cow out to stretch her muscles? This is a pretty delicate problem to speak upon, because the general practice and the general belief is that cows must be let out for exercise. I think they are exposed too much. I have no objection to the exercise if it is not obtained at the expense of exposure. The Hollander has never practiced it. He puts his cow into the barn in the fall and she does not go out until the next spring. She is stabled continuously for six months. They have a trench behind the cows two feet wide and two feet deep, in order to keep them clean, and they have to put a bridge over it when they put the cows in, in the fall. Under those conditions it is inconvenient to let their cows out. The weather of Holland is as severe as it is here, and they must have to keep their stables rather closely shut up, and yet I believe there is no breed of cows today which has greater constitution and greater vitality, if there is such a thing as vitality in animals, than the Holstein cow, and she has been bred for generations and generations without exercise in winter. I have no objection to a limited amount of exercise, but do not turn cows out for an hour or two of exercise in cold winter weather and hope to instill into them greater constitutions.

The dairyman must realize, also, the importance of regularity in the feeding and the milking of animals. I do not think we realize how easily disturbed an animal is. It was called to my attention a short time ago in this way: We were using a milking machine and a stranger wearing a fur coat came into the barn. He stepped in beside the two cows to see the milk flow in the little glass tube on top of the machine. He said he could not see it. Sure enough, it had stopped. Those two cows shut right off the moment that man came in. How did they do it? They certainly held up the milk and did not give down again until some time after the stranger had gone out of the barn. When the calf is taken away from the mother the latter will often hold up her milk. In these cases it is not an act of will but an unconscious effect on the nervous system. I met a farmer about a year ago who said he had a beautiful heifer, which had recently calved and was doing finely. He was milking her and was proud of her. But one day she got into the

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garden and he put her back into the pasture. The next day she got out again and the third day he whipped her, and that night he could not get any milk. The next morning he could not get any milk and it was the third morning before that cow would respond again to his kneading of the udder. The farmer had simply lost the confidence of that cow. She did not feel right towards him, and somehow unconsciously she closed her muscles in such a way that the milk would not run down. This perhaps can be appreciated more readily if one understands the structure of the udder. Above the teat is a small milk cistern holding half a pint, and above that there are little canals or ducts, which divide and subdivide, and at every division there is what is called a sphincter muscle. The cow has a certain control over these muscles. When anything occurs out of the ordinary she closes those muscles and shuts off her milk,—not all of it but some of it. Now when you ill-treat a cow or when you fail to milk her when she is expecting to be milked, or when you fail to feed her when she is looking for feed, or when you in any way disturb the nervous condition of the cow, you do something to her which causes her to unconsciously hold up a part of her milk. That is the tendency. And so that is a reason for kindness and care and regularity in the management of cows. Then, too, from this structure of the udder we may learn something of the reason why it is so important to knead the udder of the cow a little when you finish milking. These little ducts are crooked, and some milk lodges in the pockets. If the udder is kneaded or manipulated towards the end of milking the yield may be increased slightly both in quality and quantity. The principle is something like squeezing a sponge.

I might say just a word about the breeding of cows. We must breed better cows, they do not exist today in sufficient numbers. The records of herds show that at least one-third of the cows are kept at a loss, and that not more than 50 per cent are worthy of reproducing themselves. We must keep records and select the best individuals in our herds for mothers of the next generation. I do not know whether you realize how short the life of a cow is. The last census states that the average period of usefulness of the cow for the country is six years. Coming in at two, she is in the herd four years. We seem to

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do a little better in New England, where the average is five years. That means that every five years we have to replace our present herd with another. Are we going to buy it or are we going to breed it? If you pay $75 for a cow and sell her for $25 at the end of five years, there is a depreciation of $50. If she has produced 250 pounds of butter a year, in five years she has produced 1,250 pounds, which means that you have got to deduct four cents from the income from each pound of butter which that cow produced, to make good the loss from depreciation. That is a serious drain upon the profits of the dairy. It is something which the ordinary man does not take into consideration. We think if a cow pays for her food and two or three cents more a day, we are making a profit. We do not stop to think that we have got to replace that cow. If the average cow lives four years she will produce four calves, and two of them on the average will be males and two of them females. So that we will need about every other heifer calf which is produced in the herd, or we need two calves from every other cow. You want the heifer calves from the best half of the herd. There is the starting point in breeding, first to find out the best cows of your herd, then make up your mind to raise the heifer calves from every other cow. Now shall we breed them or buy them? If I were to convert you all to the necessity of good cows and you should start out to get them, you could not find them. There are not enough of them. I think on the whole we can get cows with greater certainty by breeding them. I do not know what the southern New England farmers who sell so much of their milk are going to do to get their cows. They do not raise their calves. Up here in Maine where so many of you are making butter and have skim-milk, you can raise calves. The one thought I want to present to you is this: You must attempt to graft on to your herds the superior qualities of an improved blood, in other words, use a pure bred sire. Why? Simply because of this principle,—in breeding the offspring inherits on the average about half of his qualities from his parents and half from his ancestors, one-fourth from the grandparents, one-eighth from the great grandparents, and one-sixteenth from the great, great grandparents. Now suppose you use a grade sire and you select him from the best cow in

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your herd. The offspring from this male derive one-fourth their qualities from the father, one-fourth from the mother and one-half from ancestors more remote, which are probably inferior. That is the objection to the grade sire. You do not know the history of the ancestors. There are probably many inferior ones, and he may transmit the qualities of those inferior ancestors with just as much certainty as he does the quality of the dam. For that reason select a pure bred sire, one whose ancestry is known. I think as dairymen we fail to appreciate the great amount of good that the breeders of pure bred cattle have done for the dairy industry. You cannot measure in dollars and cents the benefits that we owe to the Jersey and Guernsey breeders for producing animals with these qualities. We should take advantage of these qualities which it has taken generations to produce, and graft them on to our working herds.

In relation to warming water for our cows, theoretically it looks good. You will say that a cow is a great consumer of water. A fresh cow giving a good flow of milk will drink 100 pounds of water in 24 hours. If the water is at 32 degrees one might think that food would be required to warm it up to the temperature of her body. Yes, a certain amount. But the cow has a large amount of waste heat which she has got to get rid of, if she could not she would be uncomfortable. That is the trouble with a steer when you confine him in a close stable. He is too warm; it affects his appetite. There must be a point where if you expose a cow too much to cold weather and give her too much cold water she begins to use her food to produce heat. I cannot tell you whether it will pay to warm water or not. A few experiments have been made where it did seem to pay; others where it did not. I should say that if your cows are forced to drink ice water it would pay to warm it, but it would not pay so much as you might think at first.

Ques. In speaking of the matter of ventilation you said that the heat from a cow's body would be sufficient to warm the barn. Is it not a fact that the excretions from the pores and the lungs are poisonous? Are not the excretions from the pores loaded with germs and the excretions from the lungs loaded with carbonic acid gas?

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Ans. That is correct; you certainly must change the air. But the cow will give off enough heat from her body to enable the air of the barn to be changed once an hour. All of the food which the cow digests is finally degraded to heat except what she puts into her milk. This heat you must make use of to warm the body of the cow. Whether it is sufficient or not I cannot say.

Ques. In relation to the water, is it not possible that there is a happy medium between giving water too warm and giving ice water?

Ans. Yes. That is one advantage in having water basins in the stable. The water is somewhat tempered by the atmosphere of the stable. If the water is drawn from a well just as it is given that water is warm enough. It will not pay to warm water at 50 degrees, the temperature of most well water. If it is down to freezing, that is a different problem.

Ques. Is the richness of the milk increased by the food the cow consumes? Will feeding rich foods increase the butter fat?

Ans. I think not. The quality of the milk which a cow gives seems to be an inborn quality, you cannot affect it materially. There is a slight change from a heifer to a mature cow. I reviewed some 4,000 milk tests of Holstein cows, some heifers and some three, four and five years old. The milk of the heifers was about two-tenths of one per cent less rich. It has been observed, too, that when cows go to pasture, and have a violent change of food, they will sometimes increase a little, but hardly ever more than .2 per cent. I do not know whether it is due to the change in food or to the fact that she likes the out-door air and sunshine. Usually that is temporary, however. There are one or two feeds which have the reputation of increasing the per cent of fat in the milk. Cocoanut meal is one of them. But no ordinary food changes the quality of milk.

Dr. C. D. SMEAD. I have listened with a great deal of interest to Prof. Beach's address. He has brought out a great many fine points. I will say for one that I was highly instructed. There are some questions that he touched upon which are unsolved today from the health point of view. We should keep the cow comfortable and yet give her a sufficient amount of

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exercise. We may shut ourselves up, even in the State of Maine, in a room which is kept at the right temperature, we may eat just the proper quality of food, and yet when spring time comes we are not very well prepared to work. There is a muscular tone that must be kept up to maintain health. I wish some one was able to tell how, under all climatic conditions, we could keep the cow up to the tone of nervous energy with food and air. I am only giving my opinion from observation, and that is, that with all of our patent systems of ventilation, we must give the cow some exercise in some way, or I know that I am called in when spring comes to help her out. I am coming more and more to the conclusion that a good covered barnyard with some north windows in it, makes about the best ventilation we have. Then we can turn the cow out unless the weather is too cold. You may have it cold enough here so that it would not be policy to turn her out. Down in New York we have heard these matters discussed for years. Perhaps it is the pioneer state for discussing them, but of all the barns in the state of New York, some of which cost half a million dollars, the best to my mind is one that cost $584 for lumber and the farmer himself and his hired man built it. He is a prominent breeder, a winner at St. Louis, Clayton Taylor of Collins Center, N. Y. He has nothing expensive. He simply puts his cattle into the stancion long enough to milk them, and then they go out into a yard and I never yet have seen a healthier herd than his. I am coming more and more to the conclusion that we can practice some of Prof. Gowell's hen house ventilation in our barns to better advantage than if we tried to get in too many new fangled ideas.

The professor said that 1¼ pounds of protein was required for 10 or 12 pounds of milk. I would like to know how we are to furnish the cow with that amount of protein in the foods we get, using the milk standard as our gauge. We know that in the case of some of our concentrated foods on the market, if we feed them alone we have trouble. If we feed cottonseed meal or linseed meal without mixing it with some other class of foods, we will have the cow off in her digestion. In my observation it is a great deal easier to unbalance the system of the cow or her digestion by overdosing with protein than with carbohy-

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drates. I would like to have the professor explain how I am to feed my cows that amount of protein?

Ans. Suppose the cow gives 20 pounds of milk. Ordinarily milk contains 3.6 per cent of protein, and 20 pounds of milk will contain about three-fourths of a pound of protein. You have to supply that anyway or she cannot give milk. Experiments show that when the cow is dry, not giving milk, she needs about three-fourths of a pound to maintain her body. This makes 1½ pounds. In addition, there is a third way in which protein apparently is used by the dairy cow, and that is as a stimulant in milk production. The minimum amount is 1½ pounds. She must have that to put into the casein of the milk and to maintain her body. And the German standard provides an additional amount of the protein to be used as a stimulant in milk production. Somewhere between 2 and 2½ pounds must be supplied to get the best results. How are we going to give that protein? The ordinary home grown foods, like timothy hay, mixed hay or silage, corn, barley or oats will not do it. No sort of combination which we can make of those foods will supply that amount of protein. So it must be supplied in rich, nitrogenous foods, as linseed, cottonseed or gluten, or a mixture of them. I do not believe in feeding too much cottonseed. I would rather feed a little linseed in connection. The protein must be supplied ordinarily by purchased by-products.

Ques. Suppose the cow does not take much above 30 pounds of timothy hay. She would get from that not far from three-fourths of a pound of protein. Would you supply the balance with cottonseed meal, or linseed meal?

Ans. The 30 pounds of timothy hay would contain .84 of protein, just about enough to maintain her body. I would not make up the balance with all cottonseed or all gluten. I should want to feed some mixed hay or clover, if possible, which will increase the protein. If the timothy hay is all the farmer has he should feed the grain with some silage. I like to have half the grain ration consist of bran. It is safe, cooling and bulky. But at the present price of bran, that is out of the question. You can distend your grain somewhat by mixing it with cut feed or silage. I know a farmer who one year fed nothing for grain but cottonseed meal. He fed as high as six pounds of cotton-

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seed, but he bought cracked corn cobs and mixed the cottonseed with it. It distended the cottonseed so that there was no indigestion, and no evil results. It is on the same principle that corn and cob meal apparently is better than clear corn meal. I do not mention that as advocating the feeding of that much cottonseed. I should not be afraid to feed two pounds a day, in two feeds, but I would rather mix it with bran.

Dr. SMEAD. I am going to tell you frankly that the State of Maine, I think, is feeding more cottonseed than any other state in the Union. And I am actually having more inquiries from the State of Maine than any other state. It is the evil effect of feeding cottonseed. It is not the quantity altogether, it is the method. If the cottonseed is to be fed with the timothy hay and the roughage, it can be fed only in small quantities without evil results. My advice is to mix it with bran and not feed it all at once. Feed it in two or three feeds and feed it with ensilage when you can. There is only one safe way, in my judgment, to feed cottonseed and that is to feed it with some succulent food, and then mix it with some wheat bran and a little quantity of linseed. Cottonseed is constipating. While it is a great milk producer it produces other troubles unless it is fed judiciously.

Ques. I would like to have Prof. Gowell tell us about his method of ventilating by cloth screens.

Prof. GOWELL. I have constructed this fall a little house 100 feet long. I dug into the ground three feet and scooped the earth out on one side, and built the house about three feet into the ground and three feet above the ground banked up. That gives a warm basement. The soil is sandy and well drained. The front has cloth curtains, five of them in a hundred feet, 12 feet long and three feet wide. Sixty feet of that building is open through the day to let the pure air in to the birds. They are practically in the out-of-door, pure air, but they are sheltered and protected. When the weather is too rough the curtains are shut down and still more or less air is passing through them.

I believe that sometime we are going to construct a great many buildings of that kind for the carrying of our cows or young stock through the winter; buildings where the front is open and protected from the roughest weather by a cotton cloth,

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but never by more. And by opening these curtains and having the pure air and the sunshine come in through the day, we can keep our animals in the pure, dry air. I am frank to say that I have not much faith in the systems of ventilation advocated so much. I know it is true that the carbonic acid settles to the bottom, but is it possible for us to have the air in the stable where our animals are moving around so still that the lower air is the poisonous layer? I believe that we should get purer air with the open barns.

Dr. C. D. Woods. I have certainly been very much interested in this discussion, and believe that we as Maine dairymen must give attention to these points. We have been studying upon them for years, and still the advantage of our getting together is very great, in stimulating us to do a little better in our practices than we have been doing. There are certain questions of ventilation, of breeding and feeding, which are still important to us. We have not solved them all. We have problems of feeding today that come home to us with new force, because our conditions have so wonderfully changed in five years. I shall try to talk to you a little tomorrow about our commercial feeding stuffs and the state of the markets in connection with them. I believe that here in Maine, where we have been using cottonseed so much (and in my opinion we are the largest users of it according to cow population of any state in the Union) we have used it successfully. We have had very little trouble that can be traced directly to the use of cottonseed. I believe that Mr. Ellis, when he commenced to talk to you about foods rich in protein and directed your attention to cottonseed and gluten, which then could be procured readily, was on the right track, and much of our successful dairying is due right to that one article, cottonseed meal. We are so far away from the markets that when we look into them for something to feed we must get something that we can procure in a pretty concentrated form. We are a long distance from where these by-products, many of them, are manufactured. But if we are to use cottonseed meal, we must feed it with brains; and yet it does not take as much brains to feed it as to feed corn meal. I would rather turn a green man loose with cottonseed meal and a cow than with corn meal and a cow. I am rather inclined to think that the com-

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plaints that come are from the man who has not been careful in his feeding. We certainly would like to use it with wheat bran, and we are very sorry that wheat bran costs so much. We have to pay $30 where we used to get it for $12. We shall have to be very chary in mixing wheat offals into our feeds. We want to use some of them, I wish we could use all of them, but I do not see how we can do it under present market conditions. I think we are on the right track with cottonseed meal. Use it as we have been using it, use it with all the intelligence we can, and it is our cheapest source of protein thus far. We can get linseed meal at the same price per ton, but it does not furnish the same amount of protein. If we take into account the carbohydrates, it is about as cheap, but those of us who have all the carbohydrates we want and are only looking for protein, can get it for 2.7 cents in cottonseed meal and 3 cents in linseed.

Prof. F. W. CARD. I should like to emphasize one line which the professor has brought out, in relation to the business problems involved in dairying. He has given us figures in regard to several cows, the five best and the five poorest in the herd, and he has shown that with a very little difference in the cost of the food consumed, there was a marked difference in returns. There was the same investment in the farm, the same investment in buildings, there was doubtless pretty nearly the same investment in cows. There was an addition of just a few dollars in expense, and a difference of 800 per cent in profit. Now it seems to me that right along those lines we need to concentrate our thoughts more than we have done in the past. We need to study these problems as a business man studies the cost of production and the returns. If there is any one thought that I should like to emphasize, it is just this,—the dairy business is a business which calls for heavy investment. The whole equipment is expensive. There must be a heavy capital before we begin to produce, and we must utilize that capital to the very best advantage if we would get a profit out of it. It seems to me that the dairy business is a most difficult one from which to get satisfactory returns upon the investment. I believe there are more dairies in the country that are failing to yield any adequate profit than any other line of farming. Yet, on the other hand, there are dairies which are yielding admirable profits, and it is owing to just the study of these little points, and the business principles which underlie them.

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WEDNESDAY, DECEMBER 4.

BETTER METHODS.

By LEON S. MERRILL, Solon, State Dairy Inspector.

A quaint old Yankee farmer once said "I guess why I haven't succeeded any better in dairying is because I haven't set my face that way." This thought so tersely put, explains in large measure many of the failures we meet all along life's way. It also suggests the reason for so many successful lives.

Better Methods—a subject broad in its application yet pregnant with meaning to each individual. The business man is reaching out for them. For him they mean economy of time and money. They are applicable to the smallest as well as the largest business. Educators along all lines are giving this matter much thought. And thus is it everywhere; the merchant, the manufacturer, the physician, the farmer, the whole progressive world today is looking and striving for something better.

In that splendid exhibit of dairy animals at the National Dairy Show, recently held in Chicago, one could see the results of the great struggle for excellence that has been taking place. In the machinery exhibit could be seen marked evidence of keen competition. The striving for improvement is incessantly going on. We go into the markets with our money and we reward the men who have given us greater excellence either in animals or machinery. We appreciate these especially, for they have visible form and they appeal to the eye, while all about us are better methods, equally valuable, but lacking apparent tangibility we often pass them unheeded. Largely imitators are we, lacking only the presence and association of leaders to make our lives more successful. We read of improved methods in culture of grains and grasses, yet too often we wait for someone in our immediate vicinity to show us the way. We hear of dairy cows of large capacity and yet content ourselves with the 150 to 175 pound cow, because—why, because we haven't set our face that way.

Great progress has been made in the past and is still being made and yet the vines and the trees are crying constantly for

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a more and more complete understanding of their needs, the soil is calling for a still more intelligent tillage.

Many ideas which at first seemed radical have been worked out and the solution has brought satisfactory results. The tuberculin test, so firmly opposed by many dairymen in the past, is recognized as of immense value.

It was Holmes who said "I find the greatest thing in the world is not so much where we stand but in which direction we are moving." How true that is and what an influence the mind has in the matter. It is the way it looks at great questions and how it looks at them that determines in which direction we are going or whether we are merely standing. I have been impressed many, many times with the importance of this moving in the right direction. What a wonderful influence it has upon a man's life, when he does things, when he seems to get in the habit of doing things. Then there is the influence it has upon a community, upon the boys and girls growing up in our midst. They look on a busy world where men and women are striving and winning. Is it any wonder then, that young and ambitious lives are stirred by the activities and possibilities they see? I feel sure that better methods for educating our boys and girls for farm and home life is a necessity.

As we look back over the past ten years we note the great progress that has been made by the dairymen of our State and very largely this progress has been made along the line of quality. The question of quantity has troubled us somewhat but the production will be materially increased when conditions that have been interfering with its progress have been solved.

While criticisms and condemnation of gathered cream are common in many parts of our country, the Maine farmer is furnishing a quality of cream that has gained an enviable reputation in the sweet cream markets of New England. But we must remember, that the road to success is a hard one, up hill all the way and that a position once gained can only be maintained through constant and intelligent effort. More and more is the consumer becoming an important factor in this struggle for position in the markets of the world, and rightly so, I believe. We expect and demand purer feed stuffs, cleaner seeds; we believe in supervisory laws, in more careful inspection; and with

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such a valuable article of food as milk that the demand for a purer and cleaner product should come, is inevitable. That this demand should be met with intelligence is the part of progressive dairying. It is true that some of the regulations issued by boards of health have sometimes seemed unnecessary and frequently appear to work hardships upon the producer, yet these are actual conditions which must be solved through co-operation and through a more thorough knowledge of the science of dairying coupled with the progressive spirit that is abroad in the world. I think it is well recognized as a fact today, that creameries have become the natural outlet for our dairy product. Through their progressive methods and knowledge of market conditions and requirements a great demand has been created for Maine cream, a demand fast outgrowing the present supply. That the markets thus secured have been profitable ones, I have had impressed upon me lately as never before. While in the West I made special inquiries regarding prices paid the farmers for their cream and I learned that in some states where centralizing plants were handling the bulk of the milk, the lowest prices prevailed, running for the month of August about 20 cents. In other states the highest price I heard of being paid for August was 25 and one-half cents while here in Maine so far as I know the lowest price paid for the same month was 30 cents. These prices present quite a wide margin in favor of Maine and her sweet cream product. But along with these higher priced markets for cream have come the demands of the consumer, the more rigid regulations of city authorities. One of the largest cities in which Maine cream finds a ready market has said to the producer and dealer in milk and cream, your product must contain less than 500,000 bacteria to the cubic centimeter and it must not be placed upon the market at a higher temperature than 50 degrees. Neither of these requirements should be difficult to comply with. The matter of temperature is one with which the shipper and dealer alone are concerned but the bacteria content, concerns the producer vitally. Pasteurization and low temperature have been practically the only means adopted so far, to keep down the rapid growth of the vegetable organisms, whose development plays such an important part in the changes taking place

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in milk and cream. The growth and the very existence of our sweet cream business has depended upon a constant adoption of better methods at the creamery and upon the farm. A few years ago fully one-half of the cream received at the creameries was defective for sweet cream purposes while today scarcely more than 5% can be placed in the defective class. This result can be traced in large measure to the practice adopted by nearly all of our creameries of grading the cream received and returning a higher price for sweet cream than for sour or otherwise defective cream. It is evident to those who have closely studied these matters that the next great move toward better dairy products in this State must and will come, through better tie-up methods, through a more definite and accurate knowledge of the composition of milk, of the changes taking place in it and the reason for such changes. Then will the farmer be able to adopt methods that will practically and inexpensively produce a better product, better because very largely there have been eliminated the causes for the rapid development of undesirable flavors, odors and conditions. This is a great educational work such as has preceded all agricultural and dairy progress. Laws have been enacted by many states looking toward the more sanitary production of milk. We have in this State such laws, but the measure of requirements of these laws is always the standard erected in the minds of the people. As progress is made and the standard of excellence raised, so will our ideals of what constitutes reasonable and just laws for governing the production of clean, wholesome milk be raised.

City authorities are giving the care of milk and cream for city consumption, by both producer and dealer, more and more attention. Creameries are being placed under rigid inspection laws but the time and expense required for inspection of herds and barns belonging to the farmers selling their product to creameries and cheese factories, in the past has been felt to be almost prohibitive. I feel however that as many as possible of these visits among the farmers should be made; that a man doing this work should visit the farms with a definite purpose in mind; that he should carry to the farmer practical ideas upon stable construction and sanitation, upon the selection, breeding and care of dairy animals and upon the care of milk and cream.

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We should understand that the milk into which has been introduced straw, hairs, dust and oftentimes other dirt, no matter how much care has been used in straining or separating has not the real value, as has the milk which has never contained such foreign matter. I say such milk has not the real value and to any one who has been keeping in touch with the trend of the times it must be apparent that the time is quite here when milk produced under better conditions will bring to the producer his reward in the shape of better prices. This work of education for better tie-up methods is of vital interest to the producer. It is a work in which every one should co-operate. In furtherance of the work it was planned to have an educational exhibit of milk and cream made at this convention. The milk was to be scored for flavor, composition, acidity and condition. Certificates of merit beside the premiums were to be awarded exhibitors. In addition to the scoring, the Wisconsin curd test and a bacterial count was to be made. A lack of funds absolutely prevented the carrying out of these plans, but during the coming year the Department of Agriculture will endeavor to hold one or more educational milk and cream exhibits, in the firm belief that they will prove of great value to the dairymen of the State. These exhibits, together with public meetings and personal visits among the farmers will be carried out in so far as time and money will permit. I have not gone into details on improved tie-up methods as a gentleman representing the Dairy Division of the United States Department of Agriculture is to speak on "Cleaner Milk-why-how" and I have no doubt he will take this matter up in a more thorough and interesting manner than I could.

So much regarding quality and we come now to one of the serious questions confronting us, that of quantity. Intimately connected with the question of quantity is that of profit. Poor cows and still poorer care always produce unprofitable conditions. Our chief concern should be to evolve a practical remedy for such conditions.

In dairying as in other business, the constant employment of better methods is a necessity, more careful selection and breeding of the dairy cow, more thoughtful care of her health and comfort. Dairying must receive its greatest stimulus through

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increasing the dairy value of the dairy cow. Increased production along with better quality we must aim for. Tell me why the average production of the dairy cow is so small. Why, it can be for no other reason than that our ideals in the past of what constitutes a good dairy cow have been too low. Here and there we see notable results from having ideals in breeding. We see the slow but sure building up of dairy herds to positions where they are on the safe side of the ledger, even in these days of high priced feed stuffs. A man owning such a herd is occupying an independent position in farm life today. The true dairyman is always building for the future. One of the chief aims of life should be to live a little better and to do life's work a little better today than we did yesterday—tomorrow than we did today.

This matter of profit or loss in the keeping of the dairy cow has been discussed for many, many years and it is generally recognized by farmers that they should know not only the production but the cost of production of the milk yielded by the individual cow. Some farmers understanding the importance of this matter to their individual success have bought hand testers and have made a more or less accurate determination of the butter fat yield of their cows. Some still continue to make tests regularly but I am afraid many of those testers are not in regular use, if at all. Very few farmers make an accurate determination of the work of their cows for a full year. Now this condition does not exist from lack of instruction. Its importance has been taught by Institute speakers, by agricultural colleges and agricultural papers for years and now object teaching is being added to the other lines of educational work.

I believe the best plan so far developed is the Cow Test Association, along the lines advocated last year before this association by Mr. S. C. Thompson and which the association endorsed. I believe it is the best plan because it furnishes an accurate account upon both sides of the ledger of the work of the individual cow. It is good because it means co-operation, it recognizes the community of interests existing among farmers, because the information thus gained furnishes the foundations upon which to build a more and more profitable dairy business and because the importance of breeding and local breeders'

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associations will be forced home to its members. So that without hesitation I say that the organization of Cow Test Associations and of local breeders associations is the most important work the dairy interests have before them today. The Department of Agriculture is making every effort to bring about the organization of Cow Test Associations and is prepared to give to them every assistance within its power. The effect of such associations across the ocean have been far reaching. In Michigan, where the first one was organized a little over two years ago, similar results are already manifesting themselves. Mr. Rabild, the gentlemen who brought this work to Michigan from Denmark where he had practical experience in it, is at the present time organizing their sixth association.

So in conclusion I will say that the work of the department during the coming year will be toward producing a better dairy product through inspection of creameries and cheese factories, educational milk and cream exhibits, public meetings and as frequently as possible personal work among the farmers; toward securing a greater production by encouraging the organization of Cow Test Associations.

We believe that our greatest progress has been made when we have been working persistently on definite plans, that the greatest good always comes through the teaching of positive doctrines.

REMARKS BY ORIN BENT, Boston, Judge of Dairy Products.

I am very glad to be with you. I enjoy meeting the dairymen at these meetings. And I must say that I was surprised to find such butter. The quality of your butter in general has shown quite a marked improvement in the past few years, but under the conditions, with the high price of feed, I did not expect to find as good butter this year. It is remarkable to go through a lot of butter like that, on exhibition, and not find a single mottled piece. Very little sour flavor showed in the samples and the whole exhibit indicated very careful feeding, and ripening of the cream, and great care in the making. I believe much of the improvement may be traced to the work of your State Dairy Instructor and of the Agricultural College.

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REMARKS BY R. W. ELLIS, Embden.

I have been in the dairy business for quite a long time. I am well aware that when a man gets up to face the members of the Dairymen's Association, he is facing the best part of the agriculture of Maine. The dairymen of Maine represent the most intelligent class of the farmers of Maine, from the fact that the dairy business is the best business that is carried on upon the farms of Maine, and the most intelligent are the quickest to see it. I cannot be expected to tell you anything you do not already know. It is hard for any man to come into the State of Maine and tell the dairymen anything they do not already know. But we can bring old truth before them in a new light, and impress it upon them more thoroughly, and do some good thereby. We have heard these talks, lo! these many years, on the dairy question and on the feeds to raise for the dairy cow. The matter of clover production we have heard discussed from away back. Men have come here who have been thoroughly imbued with the idea of bringing up our rundown farms with clover. Every man here knows the value of clover as a land renovator. We all understand that perfectly well. But clover is biennial; we cannot keep it more than two years anyway, and the oftener we go over our land the more clover we can get. Now I believe in a quick rotation of crops. Our method is first corn, then oats and peas, then clover for a couple of years, and repeat. That puts our soil in the best possible condition to stand drought, and to stand excessive wet. We had a wonderful season this year, and it has opened my eyes so that I see things differently from what I ever did before. I have been in the farming business for more than 55 years, and this season has truly been an eye opener to me. I have learned things that I never knew before, and things which I did know have been impressed upon my mind more strongly than ever before. We had a very peculiar season in our locality. Nothing started to grow until the last part of June. Then the weather became good and crops grew very rapidly; everything went ahead by leaps and bounds. We had 12 acres of corn which was the pride of my heart. I used to visit it almost daily, and every morning I could see that

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it was larger and stronger and more vigorous than the day before. It grew in that way until about the 26th of July, and it almost entirely covered the ground. Then we had a storm the like of which I hope I shall never see again. From four to five inches of water fell in twelve hours, with a terrific wind, and we had a hail storm in our immediate vicinity that destroyed everything; squashes, pumpkins, beans and peas were utterly destroyed. And our corn we thought had been destroyed. Before the storm it stood up as high as a man's head, and after it there was not a stalk that stood six inches from the ground. The leaves were all stripped to pieces and it did not look as though it could possibly amount to anything. Our neighbors were discouraged and let their corn go. But that field of corn was our main dependence, and we could not afford to lose it if it could possibly be saved. Within two or three days we had another rain of an inch, which saturated the ground. Just as soon as the wind was in the direction to right up the corn, we went through it with a cultivator. The first time we went through it, we broke it all up. But we went through it again and pulverized the land some more, and we kept going through it until within ten days of gathering time, and we got a fair crop of corn, while our neighbors did not get enough to pay for gathering. That was the result of a good soil and constant cultivation. When the soil is in proper condition it will stand both drought and excessive moisture a great deal better than when the humus is all out of it.

I have experimented a little with different crops in feeding stock. Sweet corn, planted for the factory, will produce from 10 to 12 tons of fodder to the acre for silage, besides the corn which is taken out for the factory. If a large growing variety of corn is planted, it will produce from 12 to 20 tons. From six to seven tons of ensilage will carry a cow through the winter. It is not profitable to feed that alone, but that is what it will take. I have experimented by weighing out the ensilage for a number of cows for a certain length of time, and they will do first rate on from 60 to 70 pounds per day, with nothing else but the grain. Sixteen pounds of oat and pea hay per day will feed a cow. The next year after you have taken off the crop of corn you can raise 2 to 2½ tons of dry fodder in oats and peas,

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which will more than feed one cow. And then in the next two years you can raise 1½ to 2 tons of clover per acre. A great many people think they can raise more than that, but if you have never weighed it you will be deceived in the weight of your clover. It weighs heavy when green but dries out amazingly. According to our experience, one and one-half to two tons is a heavy crop of clover. You can make every acre of tillable land on your farm feed a cow for 200 days. If a man has 25 acres or 50 acres, he can know just about how many cows he can make that carry, if he will follow this system of rotation of crops. There are a number of farms that I know of in this State, which will carry a cow to every acre. This can be done, but how many are there who do it? How many of you do one-half as well? You know all these things that I am telling you, but it is one thing to know them and another thing to do them. This matter has to be iterated and re-iterated, until some will get the idea and go away and profit by it. Then another, seeing the result of their work, will catch the idea inadvertently, and that is the way we have to reach the great majority of farmers. They will not come out to these meetings, and it is through the more intelligent and more industrious ones that we reach the mass of the people.

I always like to stand up before an audience like this, teeming with intelligence, met here for a purpose. I hope that you will treasure up what you get here,—not from what I have said as I have talked to you time and again, but from what some one will say, even if it is on the same subjects that have been talked year after year, and will carry it home and profit by it. I have just thrown off these few ideas in a broken way, and if any of you can catch any idea that will do any good, I am thankful for it.

Ques. What amount of seed do you use for oats and peas? Are they sown at the same time? And how much clover seed do you use per acre?

Ans. I usually sow a bushel of peas to the acre and two bushels of oats. It depends upon the kind of oats. We generally buy our seed, and sometimes we get oats that are as early or earlier than the peas. Ordinarily we intend to sow our peas about three or four days prior to sowing the oats. We put them in with a big cultivator, harrowing them in as deep as we

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can, and then sow our oats, and go over the piece with a light smoothing harrow, and then go over it with a roller. We never harrow in the seed. For sowing clover we usually put on about 10 pounds to the acre.

Dr. G. M. TWITCHELL. I suppose there never will come a time in our lives but that we will have some cause to regret something, and I have in mind this morning two special causes of regret. One is that in order to fill an engagement with New Hampshire workers tomorrow, I am obliged to leave this meeting this afternoon. And the other, which is of far greater importance, is that because of the financial conditions if this association and the funds available, it was thought necessary to drop out the good work commenced a few years ago by a few of our enthusiastic dairymen in the State, in the way of special prizes for young men at our University. It seems to me that if it had been possible in any way to have carried forward that work, it should have been continued, and I hope means may be devised in the not far distant future whereby it may be taken up again and be effective. For if we are to succeed in the dairy business it will not be because men of 45 or older will change their methods, it will be by the work we do through our young men, those who are just coming into the field of action and who might take up the work of the farm if the subject could be presented to them in an attractive way. It also seems to me that the time has come when this association, which has now been in existence some seven or eight years and has been doing good work along dairy lines, should begin to broaden out a little. And in a simple way I have a proposition to make to you this morning, and that is, that we offer a series of prizes for the best trace of yellow corn grown by a boy eighteen years old or less, to be exhibited at the conference of 1908, the amounts to be $5.00, $3.00 and $2.00; for the best ear of yellow flint corn to be exhibited at the same meeting, $3.00, $2.00 and $1.00; only one entry to be made by a single individual in each class, and single ears exhibited to become the property of the association and to be sold at auction, before the close of the conference, under the condition that the seed shall be kept by itself and the party shall exhibit a trace of corn from this field in 1909. The competitors shall furnish a complete statement of the kind of soil, kind of fertilizer, and the facts connected with the growing of

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the crop. The sole object of this competition is to stimulate interest in young men on the farms, increase the corn crop of the State, and in the course of years to secure the establishment of a strain of corn known to possess the qualities of hardiness and vitality, to make available corn especially adapted to our climatic conditions. I have suggested these conditions because it seemed to me that they might bring us some results which will be of some benefit, and if the Society feels to adopt the proposed scheme and provide for the issuing of slips so that this matter may be brought to the attention of the young men of the State, I will see that the funds are provided to pay the premiums.

It was voted by the Association that the prizes offered by Dr. Twitchell, under the conditions presented by him, be accepted, and a rising vote of thanks was given to him. The matter was then laid upon the table until the annual business meeting of the Association Thursday morning.

REMARKS BY PROF. F. W. CARD, Sylvania, Pa.

I have much hesitation in speaking to you expert dairymen because I know that nothing which I can say will be of interest to you, along your special line of work. For, while I have something of a dairy on my own farm, I do not consider myself a dairyman. I do not consider that I have mastered the fundamentals in all branches of that business. It seems to me that it is the most intricate of all lines of farming operations, and a business which demands the most careful and intelligent study, in order that a man may succeed in it. One of the surprises which has come to me in travelling over the State is the comparatively small number of dairies and dairy cows which I have found. Of course I know well that there are large dairies and good dairies in the State. I have been fortunate enough to see a few of them, but in many cases I have heard farmers say they are keeping two or three or four cows, and it rather surprised me, coming as I do from what is primarily a dairy region. It seems to me you have in this State some special advantages in dairying. Your markets are apparently better than ours in Pennsylvania. The prices you are getting for butter fat are decidedly better than we get, and the fact that you sell much of

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your product in sweet cream removes a considerable portion of the difficulty and labor of handling the product. Perhaps it might interest you to give a few moments to the dairy problem particularly as I see it in our region. That is primarily a dairy region. In the older days the most of the butter was made in summer and stored and marketed late in the fall. In those days the wife made the butter. The milk was set in the old way, in pans in cellars, and the quality of the butter was good. It seems to me that the average dairy as we see it there, gives very little profit. I have looked at it from a number of ways, and it seems to me that there is comparatively little profit to be gotten out of it. In the first place, there are heavy items of expense, beginning with the purchased feed, which has grown to be more and more a heavy expense in the dairy line. It is not so very long ago that our farmers were not accustomed to buy feed to supplement what was produced on the farm. They expected to keep only so much stock as could be fed from what the farm produced. But now we must go into the market and buy from the West supplementary feed and I fancy if we were to sit down sometimes and carefully compare the cost of those feeds with the income from the product we are getting, we should surprise ourselves. What was left would be in many of the average dairies altogether too small a margin. Then there is a heavy investment. We can start an orchard on comparatively poor land and get good returns. But if we will succeed in dairying we must have expensive buildings, we must have good cows. Now the trouble with the average dairying lies largely in the fact that there are so many poor cows. It is partly the cow and partly the conditions. Many a cow is in result a poor cow which would be a good cow if she were handled rightly. Also, we need expensive machinery. The whole line of investment is an expensive one. That investment means interest, it means depreciation. We must take 5 per cent for our interest, at least five per cent for insurance on the buildings. The depreciation on the cow was emphasized last night by Prof. Beach. Then there is the labor item. Perhaps there is no line of farming in which the labor is heavier than in the dairy line. There is the milking which comes so constantly, and then with us oftentimes the disposing of the milk is a very serious affair. I live in a region where there is a skimming station. The common experience

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for the farmer is to milk, and then hitch up and drive to the skimming station or creamery. When he arrives at the creamery there is usually a line of teams ahead of him and he must wait. Perhaps he will wait for his skim-milk, and there will be the skim-milk and the buttermilk to load, and by the time he gets back home it is the middle of the forenoon. At least one-fourth of the day is lost for the man and perhaps for the team. There is a heavy cost. Another factor in that connection which I think is a very serious one is that too often when the farmer comes back he is bringing tuberculosis to spread among his herd. The dairy people have given us a warning that we ought to take in the matter of using the cans from the skimming station. I think this is one of the greatest menaces in the problem of dairying. Now the average returns from the creamery are small, and if we take out these items of expense, the purchased feed, the home grown feed, the interest, the depreciation, I fancy that in the average dairy there will be very small returns for the labor. Yet against this factor of the lack of profit in the average dairy, one fact comes up which is hard to reconcile with it, and that is this: The dairy regions of the country are almost invariably the prosperous regions. Go where you will throughout this country and you will find among the dairy regions a prosperity that is scarcely equalled by any other line of farming except perhaps fruit growing. How shall we reconcile those two things? Perhaps one of the reasons for the prosperity of the dairyman is that he is willing to work hard and long for small wages, but it seems to me that the underlying reason is the fact that the dairy business more than any other maintains and improves the fertliity of the soil. In many lines of farming there is a constant depreciation, a constant loss. You will find it in your own State. The potato growers are coming against difficult problems in the handling of their soil, difficulties from the diseases and insect enemies which prey upon their crops. But the dairyman is pursuing a line of farming which enables him to improve constantly the fertility of his soil. And yet, how does he do it? How does he handle that product which is so important as the basis for success? Well, in the first place there is very likely to be a long lane leading from the dairy barn out to the pasture, or perhaps out to the watering place where the cows are watered. I realize that I am speaking to

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expert dairymen who in many cases have the water in the barn. But sometimes the cattle travel over a laneway to water or pasture, and a large portion of the fertility is dropped along that laneway, going down into the stream and doing that farm no good. Then perhaps back in the pasture there is a bunch of hemlocks,—there is on my own farm, and very cold, stormy nights cattle gather in that clump of trees because it is warmer, and there are loads of fertility helping out nothing but those hemlocks. What is left in the barn, how is that handled? Years ago we used to have auger holes bored to let the liquid through. I think few farmers are so far back as that, but too often the gutter is a leaky one and the greater part of the liquid is lost before it gets to the manure pile. Half of the nitrogen is in the liquid, consequently half of the most valuable material is lost at the start. Then there are still with us many farmers who throw the manure out under the eaves. We do not use the barn cellar, as we feel that that is too valuable a part of the building. We keep our stock in the basement. Often, too often, that material is thrown out and allowed to leach, and half of what remains is lost. So that perhaps not over one-fourth of the nitrogen which that manure originally contained is left when it reaches the field. And yet here is what seems to me is the real basis of the prosperity of the dairy regions of our country. What is the remedy? In the first place, the remedy is better handling of this product. We build up the fertility of the soil and make it produce more and consequently get a higher return. We get more clover, and clover, it seems to me, is the best friend of the dairyman, or I may say of the farmer in all lines. To the dairymen it is an especial friend. It not only helps him to maintain the fertility of the soil, it not only gathers back the nitrogen which he wastes so carelessly, but it improves the soil. It gets down into the subsoil and brings up the potash and phosphoric acid and it also gives him a feed which enables him to reduce largely his expenses for purchased protein, not only improving the soil but improving the feed.

We have talked a great deal about making the farm a carbohydrate factory for feeding purposes, but it seems to me we ought to do more, to make it a protein factory. Is there any reason why we should limit it to carbohydrates? I suppose you cannot grow alfalfa, but I do not know that it is any great loss.

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It does not work into a rotation so well as clover, and I believe a rotation is really the basis of successful soil handling. Again, I believe we can do something to get more protein in the grain which we produce. Mr. Ellis mentioned peas and oats. Instead of putting in two bushels of oats I put in one bushel of barley and one of oats. I have found that a combination of oats, peas and barley gives a grain which helps out in any line of feeding. It is not so rich in protein as some of the concentrated feeds, but even that with clover hay, if you do not buy a pound outside, will give good results with dairy cows. It is a good crop to use in any state. It may be cut and fed green, or it may be ripened and cured as hay. It is a fairly good crop with which to seed for clover.

I do not want to go into the matter of soil fertility too deeply, but it is the basis of our success, no matter whether we are engaged in dairying or any other line of farming. We are just as much concerned with the fertility of the soil as we are to produce the crops and market them. This growing of clover or some leguminous plant is one of the factors in the fertility of the soil. Another very important factor is the texture, the mechanical condition of the soil. The clover plant helps out in that respect, and the rotation helps out still more. When we apply stable manure to the field we are doing something to add humus to the soil, and humus, or decaying vegetable matter is really the most important factor of soil texture. But more than in any other way we are improving and maintaining that texture by the rotation, of which we will speak. Whenever we turn under a good heavy sod we are adding vegetable matter to decay and maintain the soil in the best possible condition. We want to keep something decaying in the soil all of the time, and then we want to look more carefully to the manure from the dairy barn to maintain the plant food. We may need to supplement it with commercial fertilizers, but I believe that first of all the dairyman should make the most of his farm fertilizers, and he is especially fortunate in that he can cut out the bill for fertilizers so largely.

Moisture is another factor of soil fertility, and the fourth factor is the living organisms of the soil, the bacteria. We have not given very much attention to that field of fertility in years past, and we do not know very much about it now, not nearly

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so much as we should like to know, but we do know enough to realize that those unseen organisms working in the soil play a very important part in soil fertility. We want to keep the conditions right for their work. When we draw a load of stable manure to the field, little, if any, of the nitrogen in that manure is in a form available by the plants. The changes are brought about by germs working in the soil, when it is in a condition so that they can do their work. The soil needs to be open and friable, it needs to have the conditions right for the admission of air, because the most important changes demand oxygen. So texture underlies this factor of soil fertility. Again, those organisms will not do their work if the soil is acid. Stable manure helps to correct the acidity. In some cases, where there is much acidity, lime is necessary in order to correct it.

I will not go into details on these points, but it seems to me, as I said before, that in dairying lies one of the best specialties to build up and maintain the fertility of the soil. Now what does successful dairying mean? It means not only the maintaining of soil fertility, but better dairy management all along the line. In the first place, it means better cows. That was emphasized by Prof. Beach last night. A man will invest in a farm, build upon it insignificant buildings, and put into them poor cows, and lose half the profit. He will perhaps fail to put a good animal at the head of the herd, saving $25 on the price of the animal, and this will mean half the dairy. We need to keep constantly before our minds that it is the last dollar of return that brings us a profit. So much of the return from the best cows goes in cost! When we get above that and increase a little, we begin to get a profit.

It means better feed. How many of the cows through your State are fed all that they ought to be fed? I know that the cows in our region are very rarely fed all they ought to have. A good feeder is the exception. Perhaps the farmer provides a sufficient amount of pasture during June and July when the rains are coming, but there comes a time in August, as it did this year with us, when the rain stops coming and the pastures begin to dry up. I doubt if ten per cent of our farmers were ready for that drought, and yet it comes over and over again, not every year but perhaps three out of five. The majority of our farmers, when it comes, are not prepared to make up the

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deficiency. It is easy to cut down the feed and lose the profit, after we have had all this foundation expense.

Successful dairying means better equipment. It seems to me that in a business which demands study, which has so many difficult and complex problems underlying it, we cannot hope to succeed unless we keep ourselves to the very best, unless we not only provide ourselves with the best cows and feed them right, but also provide the best equipment. I know a dairy farm on which the barn is situated about 20 rods from the house. The house and the barn have been in those locations ever since I can remember. There is a fairly good sized dairy, 20 or 25 cows, and all the milk is carried from the barn to the house cellar, where it is separated and the butter made. That man, weary, from his day's work, has to carry that milk day after day and month after month and year after year. It is seldom that we get such a bad condition as that, but this illustrates one of the ways in which we oftentimes work under hampered conditions. Of course it is often due to lack of capital, but I believe if we succeed in such a complicated business we must provide the best of equipment, and must give the best of care. Care means more than merely feeding and housing properly, it means the way in which the cow is treated. I have had that impressed upon me always in attending dairy meetings, and I am frank to say that I do not believe I am ready to pay the price. I have not patience enough. We talk about the gentle cow, but I find a good deal of the other disposition in cows. Now it seems to me that if we are not willing to pay the price in all these lines we had better keep out of the dairy business. Have you patience and perseverance enough to meet all these requirements? Of course I am talking mostly to men who love the cow, and they are the men who should handle her. But we who do not love the cow in the way in which it is necessary to love her in order to succeed, it seems to me had better keep out of the business. It seems to me that unless we are willing to meet all these conditions, to invest the capital and give the intelligent care, look after all the details, the dairy business is an excellent business to keep out of. But for the man who is willing to pay the price, it seems to me there is an admirable field, especially for the man who manufactures his product at home. You can get more money for your cream than for your

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butter, and in your cream trade you have an excellent business, but I think if a man is willing to cater to a special market, and to look after all the details, he has a good field in the manufacturing of dairy butter. Of course you are a little hampered in the production of corn for the silo in some parts of the State, but taking it all in all it seems to me you Maine dairymen have much to encourage you in this special line of work.

G. M. GOWELL. I am glad of this opportunity of meeting you. I hardly know what I can say to you that will interest or instruct you. We have been talking about these dairy questions so long that to me they seem to be nearly worn out, and yet the necessity for continually talking about them is apparent when we consider the subjects that are brought in here for consideration. Now the gladdest word in Maine agriculture is clover, and we have been talking about clover for 25 years and urging its growth. It means so much to our agriculture, it is so easily grown! All our conditions are favorable for its growth and yet we have neglected it all the way along. And whenever that magic word "Alfalfa" has been spoken, we have all thought we wanted to raise alfalfa, and have forgotten clover, and oats and peas, and the grasses, those old fashioned friends which have been with us always. It is our duty to breed better plants of clover, to raise better oats and peas, to grow our forage in that way and not run after those newly introduced plants which are so difficult for us to grow. I have expended perhaps more on one acre of alfalfa, trying to get a successful stand, than I would put on twenty acres of clover, and yet it is a failure. I want to grow alfalfa for my early spring work, but it is with difficulty that I am securing it. You know clover will spring up where we least expect it, where it has not been seeded or fertilized for a long time, telling us everywhere we turn that this is the plant that is natural to our soils and wants to grow, and if we will only make the most of it, it will mean much to us. I remember at one time of taking a field of two acres that had not grown a satisfactory crop of grass for a long period of years, plowing it shallow in the fall and fertilizing it with a light coat of commercial fertilizer, and harvested two tons of clover hay. Think of the improved conditions that would result from a continuation of that work, turning down a piece once in three years, turning in this organic matter and utilizing the manure produced

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from the increased crops. Think what clover has done for our farm at Orono every year for more than 25 years! In all our grass seeding every acre gets its proportion of clover, and we also grow clover by itself. The benefit does not end with the clover plant. We have not only put fertility into the soil but we have added organic matter. On these old farms where we are not farming to make money but to make homes, I am thankful that dairying does not pay better than it does, because if dairying paid so well that the capitalist could put his money into it, he would be investing in our Maine lands and we should be hirelings working for him. It is the very fact that Maine agriculture pays as little as it does that enables us to keep our homes; and one of the means of making those homes better is the growing of better plants and making a better soil, bringing the old, compact soil to life by the introduction of the clover plant, the using of organic matter and the enrichment of the soil. Down in my old home in Bowdoinham, I remember one field of eight acres where we broke the sod and with the application of a ton of gypsum brought clover in, and the following year it produced one and one-half tons of clover per acre. There is something that is encouraging in connection with this matter and a good deal that is discouraging. We have been talking about this matter for a good many years, and isn't it strange that so few realize the benefit that will result from the use of the clover plant? Another thing is discouraging, and that is that there should be a necessity for the formation of cow test associations. Sixteen or seventeen years ago Dr. Babcock perfected the Danish system, that little machine that would enable the farmer to test milk for the richness in fat and it was introduced into general use. We commenced immediately to talk about it in the farmers' institutes and at the College, and is it possible that it is necessary to urge the farmers of Maine to band together to use this little appliance which will enable them to pick out the good cows and save them, and pick out the poor cows and discard them? This is rather discouraging.

A. W. GILMAN. At the first farmers' institute I ever attended two of the subjects discussed were the dairy cow and the clover plant, and they are just as full of interest today, and there is just as much to be said about them and just as much need of

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talking about them as there is for the clergyman down here next Sunday to talk about the better life, higher conditions and better work for mankind to fit himself for the coming world. The dairy cow will never wear out. The clover plant will save our agricultural interest from wearing out. I firmly believe that it is the dairy cow, in the hands of our best agricultural men, that will preserve the fertility of our soils and save Maine's great agricultural resources. I know it would seem to be unnecessary to hold a farmers' institute or to have a State Dairy Conference, to talk about clover or the cow, but just as long as sin is in the world we have to preach against it; just as long as man loves his ease more than he does to get out and hustle and do better and have more and be more, we have got to have these institutes, no matter what my Brother Ellis did 40 years, or 30 years or 20 years ago. He attended some of my meetings this year, and he tells the people there is just as much work for us to do and it is just as necessary that we should put on the whole armor and preach the agricultural gospel today as it ever was. I do not know what you want me to say or what I ought to say, but I know what should be said and that is that the Maine dairymen should take more interest in their work. Brother Gowell has been telling us that these things were talked to the farmers 30 years ago, and they ought to know about them and do them without having any new pressure brought to bear upon them. I ought to be a better man; I ought to sin less, and sometimes I resolve that I will, but still sin is within me and I fall by the wayside. In spite of what I can do, I am not doing, myself, what I ought to do with my dairy cows. I am not putting that personal work into superintending my own dairy herd, testing my cows and weeding them out, that I should. The truth is that I do not stay at home long enough. But I tell you this question needs the best that is in us. Instead of having one dairy conference we ought to have four over the State of Maine, and instead of having one dairy instructor, if we keep abreast of some of our western states, we should have several. Such men as Brother Gowell are wearing themselves out in the work. No man in the State is recognized as better authority than he. Yet there is a great work to do after he has done all he can. One of my friends recently sent me a newspaper from Iowa, that great agricultural state, and in it I read that the

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farmers have been receiving 30 cents a pound for butter fat; that is the highest price. We have been receiving 35 cents, and that is what we are getting today. Maine is the best State in the Union, provided the average farmer gives as much attention to his business, puts as much work into it, as the farmers do in the West and over across the line. I had a gentleman from Ontario, Mr. Andrew Elliott, with me at the farmers' institutes this fall, and I trust many of the farmers have learned valuable lessons from his instructions. He tells us with no uncertain sound that the men over in his country watch their cows. Within the last ten years they have been making great strides in dairying, and in building up the fertility of their farms, selling nothing but the finished product. They have largely connected with dairying the pork industry, the raising of the bacon hog. They once sold to this country as high as $18,000,000 worth of barley, but when we adopted the McKinley Bill and imposed a tariff of thirty cents a bushel on the barley that was imported, the Canadian farmers found that it was impossible for them to raise barley for export to this country under these conditions. A commission appointed by their government was sent to the British Islands to see if barley could be profitably exported to that country, and while there, their attention was called to a new industry, the raising of the bacon hog, and they conceived the possibility of Canada becoming the producer of a superior class of hog product that would not meet the competition of the United States, and that would command a high price. This commission reported to the farmers of Ontario that barley could not be raised profitably for export, and recommended that they feed their surplus to the bacon hog. The farmers took to this new idea very reluctantly, but the matter was discussed at farmers' institutes, in the agricultural press and in bulletins sent out, and finally the farmers very generally adopted the method of feeding their surplus grain, and selling the finished product. Formerly they had been dairying for only six months of the year, but now more attention was given to this industry, and the importation and breeding of the bacon breeds of swine, the Yorkshire and Tamworth, began. From these industries they have received good returns, and they have also found that with the dressing from their added stock, and a good system of crop rotation including the clover plant, they have been able to build

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up and enrich their farms without the expense of purchasing commercial fertilizers. Mr. Elliott said that there had not been a carload of superphosphate sold except for garden purposes for many years. While they thought this government had imposed a great wrong upon them and destroyed one of their chief industries, yet it has proved a benefit to them, as from this they have developed a new industry and increased the fertility of their farms. Is there not a lesson in this for the farmer on this side of the line? If we could build up the fertility of our farms by the use of the dairy cow, the clover plant and a rotation of crops, and save our large bills for commercial fertilizers, it would be a great boon to Maine agriculture.

J. W. LELAND. I am glad to be here at this time. I feel interested in these meetings, and I put forth a great effort to come. I feel like saying to Brother Gowell, Dr. Twitchell, and these older ones who have labored so long and have been over into our county so many times preaching this gospel, not to be discouraged, because I am sure that their good works are bringing some reward, at least in our county. I am sure that we are doing better work than was done several years ago, and the results can be traced to the farmers' institutes that have been held there in the county with such men as Brother Gowell, Dr. Twitchell, Brother Ellis and many others. We get more enthusiasm and more interest at these meetings. Of course we are expected to do better work in our county than is being done, perhaps, in some other sections of the State, because the Commissioner of Agriculture lives there. We all need to be enthused once in a while, and when we meet the commissioner anywhere he is always full of enthusiasm. I think the subjects which are being discussed here will prove to be very beneficial and helpful, although they have been discussed over and over.

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REMARKS BY MR. DODGE, U. S. Department of Agriculture.

There are one or two facts that I should like to bring a little light to bear upon. To start with, I might mention a principle with which I think you will all agree, that dairy products as a general thing are not suited to transportation over very long distances. This is essentially true of milk for consumption as such, and of sweet cream. And I think you will agree that to a large extent it is true of the best quality of butter. We cannot bring that in from great distances. Now you may not think that the next few facts I have to mention have much bearing on the State of Maine, but it seems to me that they have. In seven states, which are more or less grouped by themselves, the states of New England, and New York, there is a population of somewhere in the vicinity of thirteen millions. There are nine cities in those seven states, each of which has a population of upwards of 100,000. Of those are New York City and Boston which of course are away beyond this limit. In those seven states there are fourteen more cities with a population of between 50,000 and 100,000. And after all, in this densely populated section there is something like one-third of the territory which is absolutely non agricultural,—the Berkshire Hills, the Green and the White Mountains, and this immense region of woods and swamps and ponds in Maine. That leaves but a comparatively small portion of this densely populated region to supply the products for immediate consumption. The leading among these products are of course sweet cream, milk, and the first quality of butter. Coming from the western part of New York State in this direction, as soon as we pass the central part of the state, or about there, we get into a territory which is essentially that of the dairy cow, and from there up to the eastern end of Maine we have a country dominated by the dairy cow. There are a few specialties, such as tobacco in the Connecticut Valley, some trucking regions around Boston, and the potato region in northern Maine, but aside from those the dairy cow predominates.

The city of New York uses an immense amount of milk as such. It draws that milk all the way from the St. Lawrence Valley, and eastward to the Hudson Valley and even to Connecticut and Massachusetts. That leaves, on the east side of the

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Hudson and Champlain Valleys, the New England States in which, as I have already said, there is considerable territory which is non agricultural. The southern part of these states turns the greater portion of its milk into the local markets. These numerous cities that I spoke of, although they are the smaller cities of the region, take the local milk supply. This leaves Boston to draw its milk and its cream supply from a narrow wedge spreading west and northwest. It cannot come very far to the east, and on the west are the Berkshire hills and the Adirondacks. And as soon as we reach the agricultural land of that section, the city of New York is taking all the supply. That leaves New Hampshire, a little bit of Vermont (the rest has not yet been developed as a milk shipping section) and a portion of Maine to supply sweet cream and milk for the city of Boston. Boston and New York are growing, and are beginning to interfere with each other in their territory for milk and cream.

This may not seem to have any bearing on the conditions of the State of Maine, at first glance, but I think it does have an important bearing on them. We have thousands of acres of good agricultural land, and I know from personal observation that too many of them are producing only one-fourth to one-tenth of the product they might easily produce. As this market increases, and as the products of the State of Maine become better and better established in the markets that they have made for themselves by their own quality, we shall have to produce more milk, more butter and more cream per acre, especially in this part of the State. Some day, some of the learned professors tell us, the milk business is going to extend even into Aroostook county, but we have enough to attend to here for the present. It means, in brief, that the land must be worked more, it must be turned over more. We must get more cream and more butter out of an acre of land, where there is a good acre. There are enough of these non agricultural regions that will cut down the acreage anyway.

I am connected with the Department of Agriculture at Washington, and in it with the office of farm management, so called, at the head of which is Prof. Spillman, a man who is familiar with the agriculture of practically the whole of the United States. For many years he worked in the state of Washington,

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as professor of agriculture at their State College, and he has been in the department at Washington, D. C. for some five or six years. And, with some 20 or 25 younger men, like myself, he is conducting a campaign of investigation into practical farming affairs, studying the methods which are in vogue with the best farmers that we can find through the country. By the best farmers I do not mean the ones who are spending the most money, who have the most elaborate equipment, but I mean those who are making a profit, a little better profit this year than last, who are building the land up so that the profit will not fall off, but will gain slightly in subsequent years. We are studying the methods of such farmers as that and the results that those farmers can show. I was more or less familiar with New England farming in the first place, as my home was in the northeastern corner of Massachusetts, and it is my privilege to follow this work up in the New England States and New York. This brings me primarily to the consideration of dairy questions, especially the raising of crops for the feeding of dairy cows. There are one or two general propositions that have become very evident in the 2½ years that I have been travelling up and down through this territory. One of them is that the weakest point in New England agriculture (and this applies to Maine and Massachusetts alike) is the mismanagement of grass land. By the mismanagement I do not mean necessarily that we are not raising enough grass; I mean that a good many times we are trying to raise too much. We are not following out the principles that Mr. Ellis has been pointing out to us for so many years. We have not grasped the situation and understood what it meant to us in dollars and cents.

Closely associated with the mismanagement of grass lands is the lack of a proper rotation. Mr. Ellis has just told you of the rotation that he finds eminently serviceable and profitable, and he told you how he had doubled and trebled his number of cows on the acreage with which he started, by just sticking to that plan.

There is another principle which I think applies through this same section, and that relates to the use of barn manure. This is closely allied to the mismanagement of grass land. I think it is a general principle that barn manure should be applied more frequently. Of course, taking the same number of cattle, it

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becomes necessary to cut the amount down, but I think a light coat applied frequently to the land is giving better results than a heavy coat applied less frequently. I think the more often we get over the land the better, even if we cut the amount in halves or thirds. Here is where our mechanical devices, such as the manure spreader, are aiding us. That is, of course, allied very closely to the question of farm labor, the scarcity of which we hear so much about. We can only meet that objection by adopting these labor saving appliances.

Now making the land produce more per acre means the keeping of more cows on the same number of acres. There might be several classes of land which we could find in this section. The first would be land which is adaptable to hoed crops; which is free enough from stones or surplus moisture so that it can be used in a regular rotation of three or four years, land suitable for growing potatoes or corn. Then there is a lot of land that is too damp and has too many stones just below the surface to allow it to be plowed conveniently. That land we must handle in a somewhat different way. Probably as good a method of handling this land as any is one that I have seen followed in New York, topdressing with a light coat of barnyard manure, about eight or ten spreader loads per acre, every year, and at the same time using a small quantity of clover seed and working it in with a light harrowing of some kind, either with a special brush harrow or the ordinary smoothing harrow. I have seen this done in several instances with marked success. There is another kind of land which is too rough to be handled in either of these ways, or perhaps too steep, but land which is admirably suited to the growing of apples. All of you here in this part of Maine know what good apples are, and why don't you raise more of them? If you should go to certain parts of New York you would find that the farmers are handling their orchards in an intensive manner, bringing up the old orchards and putting out new ones. In Rochester, N. H., there is a farmer who has 12 four-year-old Baldwin apple trees which this year produced four barrels to a tree. He tilled the land just as he would for any other crop.

I am looking all the time for the best farmers I can find, and studying their methods. I have not time to make more than passing mention of a few of them. One farmer in Central Ver-

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mont, as far north as we are, has 28 acres of tillage land and quite a bit of good pasturage, though it does not last for a long season, only through June and a part of July. On that 28 acres he is raising the coarse fodder for something like 25 cows and enough young stock and horses to make 40 head in all. He makes use of a three years rotation,—corn, clover and clover, sowing his clover in the corn at the last cultivation. He has a few acres which he leaves out of the rotation and on them he raises peas and oats, Japanese millet, and one or two other short season crops, which he can use to fill up the gaps. Another farm of 70 acres of tilled land is producing the coarse feed for 80 head of cows. There is a little pasture, which really serves only as an exercise lot. The first farmer I mentioned is carrying on a dairy business; the second farmer, in Connecticut, is raising milk for city consumption. He is five or six miles from one of the large towns. He is raising simply corn and clover. He grows corn the first year, and he has to raise some the second year because he hasn't land enough so that one-third will grow what corn he needs. Following the corn, he harrows the land thoroughly and sows it to rye. In the spring he goes on with a smoothing harrow, regardless of the rye, and harrows three or four times thoroughly, then sows clover seed, 12 or 15 pounds to the acre and harrows it in with a smoothing harrow. The rye comes in just the same and he has all he can cut for hay and enough to furnish him with seed the next year. After that, in a good season, he will cut one or two crops of clover. The second year he gets two or three crops of clover, and then it goes back into corn again. With such object lessons we are able to get a little insight into what can be done on rough New England farms.

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THE IMPORTANCE OF COW TEST ASSOCIATIONS.

By Prof. J. L. HILLS, Burlington, Vt.

A few words at the outset concerning work which has been carried out in several New England states, in New York and many western states in the taking of a "cow census." The results attained in the cow census recently taken in New Hampshire will emphasize the importance of cow test associations.

In the spring of 1905 a gentleman came into my office and stated that he was instructed by a prominent dairy paper to take a cow census in Vermont. I directed him to several typical dairy sections. The results of his study of 100 herds were published. According to his findings 32 herds were kept at a profit and 68 at a loss. His report was made in much detail and its publication excited much comment. His critics claimed that his survey was inadequate, his judgment faulty, his attitude biased, his knowledge imperfect, his choice of herds unwise, his motives unfair, his temperament unjudicial, his findings unrepresentative and worthless. He was charged with every crime in the decalogue and particularly with the fracture of the ninth commandment. Now these critics misconceive the purpose of such work. It is not meant to boom, to advertise, to exploit, or to compliment, but to expose. The methods of the detective rather than of the promoter are used. The observer simply states things as he sees them, without misrepresentation or coloring. Whether he sees them correctly or not is another matter.

I reviewed this census two years ago, before the Vermont Association. I tried to show what it meant and what it did not mean. A similar cow census has been taken this year in New Hampshire with a similar outcome, and many others have been elsewhere taken. A review of the New Hampshire work, analyzing data, and drawing deductions may be worth while.

Let us at the outset get a clear idea of just what a cow census is. It is simply a comparison made, on say a hundred farms, of the cost of food fed the cows and of the income obtained from the creameries. Many things on each side of the account are not taken into consideration; the manure, the skim-milk, the fat cows, the calves, home usage of dairy products, etc., on the

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one side; care, labor, interest, depreciation, etc. on the other. But it is held for working purposes that these miscellaneous incomes are offset by these miscellaneous outgoes; so the result is a straight comparison of the creamery income with the food cost. These data are taken on many farms, and are based on the doings of the average cow on each farm. An example, taken at random; New Hampshire census, herd No. 10. The observer goes to John Smith's farm and asks him as to his feeding practice. He thus determines, as best he may from information thus obtained, modified by his personal judgment, about how much is fed, and he applies the rated prices, $10 for hay, $5 or $6 for corn fodder, grain at cost price, etc. In this herd, No. 10, the hay and corn fodder were rated at $20; grain, $6; pasture, $5; a total of $31 per cow for food. Of course the farmer did not pay directly for pasture or hay, but, equally of course, he did pay for them indirectly. However it is estimated that it cost him $31 on the average to feed a cow. He milked eight cows and the creamery checks for the year amounted to $207.20 or $25.90 per cow, equivalent to a loss of $5.10 per cow. The butter fat averaged 107 pounds. The observer further states that these eight cows showed some Jersey blood, were fresh in the spring and in the fall, were stabled in a warm, unventilated barn, and that their owner read local papers but no agricultural papers.

The New Hampshire investigation covered 100 herds, varying in size from two to fifty and averaging nine cows, just such as may be found all over the better dairy sections of the State. They seemed fully up to the average in milk and butter yields and, perhaps, in care and feeding. Forty-one contained a sufficient sprinkling of Jersey blood to warrant the use of the term "Grade Jerseys;" Holstein blood was dominant in twenty-three herds; there was one Ayrshire grade herd, and the remainder were mixed lots of grades or so-called natives. Cost for food ranged from $31 to $44 per cow, averaging $35.67. These estimates were based on the average cost prices for grain feeds and on arbitrary prices applied to hay, silage, corn fodder, etc. Hay was rated at $10 a ton; silage at $3 a ton; pasturage at $5 per cow. The average income per cow varied in the several herds from $15.23 to $62.80 per cow and averaged about $33.17 representing in all cases the actual cash receipts from the cream-

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ery. The butter-fat yield per cow ranged from 66 to 249 pounds and averaged 144 pounds. 77 and 290 pounds of butter per cow were the extreme yields with 168 pounds the average. The price received for butter-fat ranged from 20.1 cents to 25.2 cents, averaging 23 cents. The creamery money returns for a dollar spent for feed, including both purchased and home grown materials, varied from 43 cents to $1.53 and averaged 93 cents. The profit and loss account for the several herds varied all the way from a gain of $21.80 to a loss of $18.88 per cow and averaged a loss of $2.50. In other words the average cow of one herd made $21.80 worth more butter than her food cost, while the average cow of another herd made $18.88 less than her food cost. This latter herd was composed of Hereford grades. Herefords are admirable beef animals, but no more built for economical milk production than is a toothpick constructed for use as a crow bar. 40 of the 100 herds made a profit over and above the food cost and 60 failed to do so. Let me once more revert to the fact that the average butter production in these herds was probably fully the average, being 168 pounds per cow. The average milk production is not stated but it must have been in the close vicinity of 4,000 pounds. Doubtless the investigator might have found—had he hunted—better dairies, better dairying towns than these he visited. But his design was to show the general run of results, not to select high class work. He made no attempt to show what ought to be done but to portray what is being done by the generality of New Hampshire dairy farmers:

LOWEST, HIGHEST, AND AVERAGE RESULTS, NEW HAMPSHIRE COW CENSUS.

	Lowest.	Highest.	Average.
Pounds of butter-fat	66	249	144
Pounds of butter	77	290	168
Price received for fat	20.1 cts.	25.2 cts.	23 cts.
Cost of food	$31	$44	$35.67
Creamery returns	$15.23	$62.80	$33.17
Creamery returns for a dollar spent for feed	43 cts.	$1.53	93 cts.
Profit or loss	—$18.88	+$21.80	—$2.50

40 herds made a profit; 60 herds made a loss.

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REASONS FOR SUCCESS AND FAILURE.

According to Mr. Lyon's statement a profit was made from the creamery sales on 40 farms in the New Hampshire census; on 60 a loss ensued. What is the relationship of modern methods to these outcomes?

There were 11 silos on the 40 farms where profit ensued; there were 7 silos on the 60 farms where no profit ensued; rich concentrates were used on 23 of the 40 farms where profit ensued; rich concentrates were used on 12 of the 60 farms where no profit ensued; 27 of the profit makers took agricultural papers and 16 of them read special dairy papers; 16 of the 60 farmers whose herds were kept at a loss took agricultural papers and only one of them took a special dairy paper; 6 of the 40 herds where profit ensued were made up of native cattle; 24 of the 60 herds where no profit ensued were made up of native cattle; 33 of the 40 herds where profit ensued were grades of dairy breeds; 30 of the 60 herds where no profit ensued were grades of dairy breeds. Let us reduce these data to a common and comparable basis.

On farms where profit was made with the dairy as compared with those where loss ensued:

Silos were more than three times as frequent; concentrates rich in protein were used nearly thrice as often; agricultural papers were more than twice as common; dairy papers were taken on two-fifths of the farms in one case and on but one farm of the other sort; improved blood was nearly twice as common in the one case as in the other.

It is interesting to note Mr. Lyon's running commentaries touching the several herds. A typical one on a Vermont farm where "progress" was *not* the watchword reads "No silo, no dairy papers, no attention to farm management and no profit. The farm is for sale." A typical one where the outcome was satisfactory reads,—"The cost of keeping is reduced by the silage, stable is hardly modern but fairly well lighted and reasonably clean. There is a manure cellar. Good care is given the cows and they respond quite well. Some of the best farm papers are taken and read."

Note these two dairies set in the "deadly parallel columns."

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	No. 49	No. 80
Cows	7 grade Jerseys.	9 Natives.
Cost of food	$41 00	$33 00
Creamery checks	$62 80	16 17
Pounds of fat	249	78
Pounds of butter	291	91
Price received for fat	25.2	21.6
Roughage fed	Hay, soiling	Late cut and poor hay
Concentrates fed	Mixed wheat feed, Cottonseed meal, Barley and oats.	Mixed wheat feed
Stable	Good	Fair
Reading	Several farm and dairy papers	None
Kind of dairying	Winter	Summer

What an instructive set of parallel data. And there are worse cases than number 80's.

Mr. Lyon in his summary of this census makes some interesting comparisons. He shows that in the average profit making herd as compared with that making a loss:

	Average profit making herd.	Average loss making herd
The costs per cow for food were	$37 00	$34 82
The returns per cow were	43 49	26 65
The gain or loss per cow were	+6 49	—8 17

That in the herds which pay a profit: Those where good proteinous rations were fed returned $7.31 per cow; those where rations low in protein were fed returned $5.08 per cow or but seven-tenths as much. That in the herds which make losses: Those where good proteinous rations were fed lost but $5.55 per cow; those where rations low in protein were fed lost $8.87 per cow or three-fifths more. The herds which make a profit were half and half winter and summer dairies; those which achieved a loss were one-fourth winter and three-fourths summer dairies.

The summary of the relationship of dairy intelligence to dairy success is most enlightening. It is the same general outcome that was found out on the other side of the Connecticut. 16 of the 100 dairymen read dairy papers and 15 of them made profits with their herds averaging $8.20. The profit making dairymen who did not read dairy papers averaged $5.20 per cow.

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The one dairy-paper-taker whose herd proved unprofitable lost $1.61 per cow; 34 of the 100 dairymen read general farm papers but no specifically dairy papers; 15 made a profit averaging $5.07; 19 a loss averaging $6.57; 24 read local papers, etc., 8 made a profit averaging $3.78, 16 a loss averaging $8.13; 24 do not read any farm or local papers; one, formerly a reader made a profit of $9.50, 23 a loss of $9.96. Still further summarizing:

Sixteen dairy paper readers, average profit per cow, $8.12.

Thirty-four general farm paper readers, average profit per cow, $1.44.

Twenty-four local paper readers, average loss per cow, $4.13.

Twenty-four non-readers, average loss per cow, $9.14.

And yet it used to be said that there was nothing in book-farming and that one could not get anything worth while agriculturally from a printed page. And the pity of it is that those who most need to profit by such a statement never attend meetings like this, never read the report of the proceedings. They know it all and always have.

Now as to the validity of their results. Who is to say whether a herd pays or does not pay? Is it not to a large extent a matter of personal judgment? Is not the census-taker a human being, and being human is not he fallible and likely to make mistakes? Does not the factor known as the "personal equation" enter into this work? Is there not chance for serious error in judgment? To all of these, yes! But the man who took this census and many others has been at this work for many years. He has no bias, no reason for stating the facts other than as he sees them; and really the general outcome is all that stress should be laid upon; the details are minor matters. My personal judgment, based upon a study of the sundry censuses taken by Mr. Lyon and by others elsewhere, leads me on the whole to believe that, while he is perfectly honest and sincere, thoroughly well informed as to and a veteran in this special line of work, he is perhaps a shade inclined towards over statements of roughage use. Yet this does not impair the essential validity of the outcome, which is not concerned so much with matters of detail and exact accuracy as with the broad aspects.

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LESSONS TO BE DRAWN.

Now the lessons which may be drawn from these census reports emphasize the need of some adequate means whereby the general run of dairymen may find out what their cows are doing. What are their adequate means? Three things need be done. The dairyman should learn to judge the cow as to her dairy abilities. He should comprehend and put into practice the fundamental principles of dairy feeding and sanitation. He should join a cow testing association. These are the three prescriptions, as it were, for remedying the situation. And I suggest that he get from the Department of Agriculture at Washington, D. C., the plain, concise and well illustrated Farmers' Bulletin No. 143, on the "Conformation of Beef and Dairy Cattle." It is so well illustrated and plainly written that he can tell therefrom something of the worth or worthlessness of his cows. It will not make him an expert cattle judge, but it will serve to teach him the fundamentals of home judging of dairy cattle, and to give him some idea as to the relationship between conformation and performance. Then I suggest that he get from the same source No. 22, on "The Feeding of Farm Animals," No. 106 on "Breeds of Dairy Cattle," and No. 192 on "The Care of Barnyard Manure." These publications—all free—will not make him an expert or solve the whole proposition, but will afford clear, plain and concise information right along the lines which will enable him better to understand the conformation of his animals and how better to take care of them.

COW TESTING ASSOCIATIONS.

And now, finally, I come directly to the main subject,—The Importance of Cow Test Associations. It is well understood that a large share of our cows are kept at a loss and that the identity of the unprofitable animals is not always or often known. Since "In union there is strength," this end ought to be accomplished to good advantage by forming what is known as Cow Testing Associations.

These are simply voluntary organizations among neighbors, providing for periodical weights and tests of milk, the keeping of records, the making of calculations, and the reporting of results, a sort of elastic organization among neighbors, designed

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simply to test the dairy ability of their animals. It is not a cast iron, but an India rubber affair. There are no hard and fast rules. They can be modified as dictated by circumstances. The system that is used in Europe may not obtain here. The methods that are employed in the Dominion of Canada may not be those best adapted to our conditions. Indeed, the conditions are such right here in New England that the form of organization best adapted to you in Maine may not be, and in my judgment perhaps is not, the best to use in Vermont. But the underlying principle is always one and the same, to afford a ready, accurate and inexpensive measure of cow ability.

Co-operation among dairymen in cow testing was first started in Denmark in 1894 or 1895. You know how small a country that is; yet two or three years ago there were well nigh a thousand of these associations, with some tens of thousand human members of them and some hundreds of thousands of four legged members. The average milk and butter products per cow have been greatly increased as a result of their work. I have not the figures with me, but I am safe in saying that, in round numbers, the butter product per cow in Denmark in 1907 as compared with that of 1896, when the associations were first started, is increased more than one-fourth. The movement has spread from Denmark to Scandinavia and Holland, to the British Isles, Germany and France, and all through the dairy sections of Europe. When I addressed the meeting of the Quebec Dairymen's Association in the winter of 1903-04 they were just starting the first cow testing association. Last year 53 were in operation in Ontario and Quebec. The first one was started in Michigan two years ago, and that one is now the parent of a dozen or more. There are several in Minnesota, a dozen in Wisconsin, and doubtless others elsewhere.

The scheme possesses great potentialities. There is a concerted movement on foot among the New England dairy interests to foster the formation of associations. A meeting was held at Amherst, Mass., last October of representatives from the various New England states. Means were considered there whereby the inception of these associations could be fostered. The report of the committee was published in the New England Homestead about a month ago. As evidence of the interest

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that is being developed in this line of work, I will say that this subject is placed upon the program of the dairymen's meeting in four New England states this year. The other two states have no such meeting. The four live dairy associations, in Maine, New Hampshire, Vermont and Connecticut, are all discussing it this year. The movement is sure to come in New England sooner or later and will accomplish the same beneficent work here that it has done elsewhere.

The association can be adapted to local circumstances and conditions. It may be an association among neighbors who employ a man to do the work for them, or they may each do the weighing and sampling personally, the testing to be done by some one individual. Or, the form which is in vogue in Quebec may be adopted, where the association is under the direct supervision of the Dairy Commissioner of the Dominion. Difference as to details are not essential so long as accurate work is accomplished.

THE HOMEMADE WAY.

The simplest way perhaps, is for the dairymen to get together and do it themselves. They need simply a set of Chatillon scales, some paper, a lead pencil and a resolve to stick to it. One Babcock tester will serve for a number of farmers. Creameries all over New England write that they believe in the movement, and will be glad to make tests at a nominal cost. This scheme is simply a band of local people who take the weights of milk themselves, each for himself, who take the samples and who send them to the creamery for testing. There are serious objections to this scheme, as there are to the other schemes. In the first place farmers are not apt to band themselves together unless there is some incentive for them to do it. The grange movement was slow to get on its feet in Vermont. It was not until the deputies got right out among the people, sat down with them and talked with them as man to man, that they got busy and formed granges. Unless there is some nucleus, some irritant like a mustard plaster, personal work done to get the farmers to thinking about these things, they will not, as a rule, get together and form associations. Then, secondly, human nature is human nature. When the tests and weights are made each farmer for himself, consciously or unconsciously

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the desire is apt to enter in to try and beat his neighbor; and he is apt to record his cows as giving a little more milk or making a little higher test than as a matter of fact they do. He does this sometimes almost unconsciously. We have had samples of Ayrshire milk brought to us that tested over 12 percent of fat. The man was taking a sample from his own herd and had no reason for raising the test. He simply was not carefully following out the sampling directions. A man may fool himself unconsciously, or, what is worse, may fool himself intentionally, thinking he is doing a good thing. It is only when candid, sincere, careful, well informed men get together that this form of the test association scheme will work well. The cost of the outfit is less than $5. Weights nor tests are taken continually but periodically. We have had a herd under survey at the Vermont Station since 1888. Every milking is weighed and the milk is tested at semi-monthly intervals. A year ago I had this data collated, including over 700 year records of cows, with a view of finding out if weights and tests taken less frequently would give correct results. We found that weights taken three days a month and tests taken three times a year, virtually the third, fifth and seventh months of lactation, would give results close enough for all practical purposes. Hence when this type of association is formed I advise weights three days a month and samples three times a year; the individual farmer making the weights, taking the samples, and (if he wishes) testing them, or sending the samples to the creamery. Are the results accurate? Sufficiently so. Can individuals do this themselves without forming an association? Certainly. Are the results public or private? Either, as is desired. Where may counsel be obtained? At any Experiment Station. The Vermont Station has given particular attention to this matter.

THE HIRED MAN WAY.

The form of association, however, which it seems to me is better adapted to your conditions in Maine is the Danish one where the farmers band themselves together, not to weigh milk, not to take samples, but to employ a man to do it for them. This means a greater outlay of money than is involved in the employment of the other scheme. It means ,however, as human nature is constituted, and taking all things into consideration, a

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more accurate outcome; and in my judgment it is better adapted to the conditions in this State, as I understand them. Twenty or thirty dairymen band themselves together and employ a man who goes from farm to farm, today at A's house, tomorrow at B's house, the day after at C's, next week at H's. Twelve times a year he is at A's house. Twelve times a year he weighs the milk of each of A's cows morning and night. Twelve times a year he takes samples from each and tests them. A does nothing whatsoever himself except to open the door to the sampler when he comes. The sampler attends to the whole proposition. Ordinarily A, B and the rest pay a dollar a year per cow into the common treasury. A, who has 11 cows, pays $11. B, who has 14 cows, pays $14. This payment may be made at one time, or in quarterly installments; or it may be withheld from the creamery check, as the creamery is frequently the nucleus of such an organization. A, having made this payment, need think nothing more about the matter from beginning to end. At the close of the year he receives a sheet of paper upon which is given in black and white the milk weights for the year of every one of his cows, not down to the last pound perhaps, but a close approximation; likewise a very close approximation to the number of pounds of butter each one of the cows made during the year. That sheet of paper is the return for the $11 invested. Is the sheet of paper worth $11? Emphatically yes. What profits it to a man to milk cows that are returning less milk in terms of dollars and cents than the food costs? There are only two kinds of cows,—cows that make more than they eat and those that eat more than they make. A certain New England agricultural writer finds fault with institute speakers who harp on this better cow proposition. He says in essence: We know that we have cows that will not pay their way, but what are we going to do about it? Where are we going to get better ones? He utterly misses the point. What use is it for a farmer to milk a cow that gives 43 cents worth of milk for a dollar's worth of food? If a Sherlock Holmes could point out the loss makers, wouldn't their owner discard them? The cow testing association is an organized Sherlock Holmes bureau. I do not care what form the scheme takes, either will tell the story; and it seems to me it is a story worth telling.

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If the employee who passes from farm to farm is fairly well informed as to methods of feeding and of barn sanitation, and if he is a man of tact, he can in many ways give information whereby the farmer can better the conditions of his stable and his herd. I was talking, since I came to Auburn this morning, with a butter maker who said, "Cow testing associations are all right, but we ought to have stable testing associations." We have such things in a way, in Vermont. The law requires that where the milk is being made for consumption in the towns and cities as such, the inspector of the Board of Health shall go about among the milk producers and investigate conditions. One of our agricultural graduates is inspector. The farmers sometimes get very mad at him, but he is a good natured chap and tells them straightforward truths, and, after two or three visits, if they do not improve their practice, they are shut out of the trade and not allowed to peddle milk until they get their barns in better sanitary condition. Nothing unreasonable, nothing impracticable, simply better, cleaner, healthier milk.

In this State you are better off, in a way, than are your sister states, in that you have an active Department of Agriculture and a State Dairy Instructor. The Department, moreover, has this matter very closely at heart, and, I understand, has exerted more or less effort to work up an interest in these associations. I do not expect my talk here will convert you all, but I do hope it will set you thinking. I believe you are in good condition in Maine to become the pioneer New England State in the starting of this proposition. Having an effective law and active and interested officials, I believe you can start on the scheme whereby the employee passes from farm to farm, and that the work will so commend itself to your dairymen that each association will be like an infection center spreading the virus to other associations and to other states.

Summarizing this matter: Concerning cow testing associations it may be said:

First, that these are simply local organizations of dairymen who seek through co-operative effort to detect unprofitable cows.

Second, that the details of their conduct are few and simple.

Third, that they are inexpensive affairs.

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Fourth, that they do not involve much work, effort or thought.

Fifth, that thousands of those organizations are extant and are doing much good.

Sixth, that the form of the organization is very elastic.

Seventh, that scores of New England creameries and many Maine ones are committed to aid in the furtherance of the scheme.

Eighth, that results are accurate enough to serve the purpose.

Ninth, that there is nothing patent, nothing proprietary, about the scheme, no promoters, nothing to sell, no one to sell.

Tenth, that the results are private property if desired but there is much good to be obtained by comparing results with neighbors.

Eleventh, that granges and creameries in local dairy centers may well form a nucleus of such undertakings.

Twelfth, that here in Maine the Department of Agriculture through its dairy instructor is, as I understand it, committed to the establishment of such organizations, is ready to assist any community which is in earnest, and invites correspondence.

Now I hope my hearers will think over this proposition, will talk it over with their neighbors, will counsel with those who are well informed, either with the Station at Orono or with the Department at Augusta, will learn of the success of these associations elsewhere, will move slowly, carefully, conservatively yet continually towards the formation of these associations in your several neighborhoods. And I venture to predict that inside of fifteen years the results in New England will be as profound as they have been in the old country.

Ques. On what days in the month would you weigh, if weighing three times a month?

Ans. The weighing may be done on any three days. It might be on the 14th, 15th and 16th, ordinarily about the middle of the month. It may be done on three consecutive days, or at different times. For example, the cow Topsy came in January 20 and went dry November 10. The first three days' weights were in February, six milkings, 79 pounds; in March 90 pounds, April, 80 and so on. One must calculate for January and November. For January, take the 12 days she was in milk and multiply it by 79 and divide it by three. For the ten days in November, take one-third of the October weight. Calculated in this way we found that 97 per cent of the 700 year records

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were within 3 or 4 per cent of correct. Now the matter of tests: Take on the third, fifth and seventh months from calving, add the three and divide by three; then calculate the butter-fat. The calculations are very simple.

LEON S. MERRILL. I have been very much interested in this talk, and I have found it to be an interesting subject all the way along, because I think it has to do very largely with profitable or unprofitable dairying. I touched but very little on the subject this morning, for the reason, as I explained to you, that Prof. Hills was to speak upon it this afternoon. But I believe, as I told you then, that dairying must receive its greatest stimulus here in Maine from the increasing of the dairy value of the individual cow, and we are unable to do that unless we have the information at hand as to the actual work performed by the individual cow. We are well aware that there are men who will perform an immense amount of work some days, but perhaps will do it in a very indifferent manner; another man will do a small amount of work and do it exceedingly well; another man will neither do very much nor very well. That is exactly the condition with the dairy cows, and what concerns us most is to find out to which class they belong. We must adopt some practical method to learn their value. There is no reason in the world why the cow should not be judged by the same standard. There is no reason why the value of the cow should not be placed according as she has done her work for us. Now here is just the point,—whether it is practicable for us, whether it is the better way, for each man to do the work for himself or to co-operate with his neighbors. As an actual fact, every man here does co-operate with his neighbors in some way, in carrying out his farm work. Men who are selling their cream to creameries co-operate with each other and hire a collector to take that cream to the Station, because they believe they can do it more economically in that way. I happen to be one who is firmly convinced that a man can do this work more economically, more accurately and more profitably, so far as determining the actual cost and production is concerned, by employing the method that the professor has recommended for the State of Maine. I have had a little experience and a little opportunity to look into the experiences of others. While I was in the West I visited the first Control Association organized in America.

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I talked with some of the farmers in that association, and heard them express their opinions upon the benefit it had been to them and the results; the stimulus that had come from the visits of that man to those farms every month, the stimulus of the monthly meetings and the presence at these meetings of men from the department. I was very much interested in the results that have come in the way of breeding. Do you know, what appeals to me as of the most value in the cow testing associations is that having the ideal before you, you are breeding for the future, building up for the future. Every member of the association has impressed upon him, forced home to him, the importance of breeding. We get no permanent benefit if the association is to be organized simply for each man to find out what unprofitable cows he has and sell them to his neighbors. But it means increasing the value and increasing the production permanently; building up the herd. That is what appeals to me,—getting something of permanent good from the associations. I have been asked time and time again, What becomes of these cows? It is natural for a man to sell them. If a man has a poor cow which is running him in debt, and he knows it, he will sell it. I was much interested in examining the report published by the department in Michigan. I noticed there was scarcely a herd that did not show one or more cows kept at a loss, and what pleased me more than anything else was the fact that in scarcely an instance did the owner keep that cow until the end of the testing period. That was conclusive to me that he was not aware that he was keeping the cow at a loss. As soon as he became aware of it he sold her. You men go out here and see an orchard, see the trees when they are grown up, and get your ideal of what an orchard should be. That is the principle we want to apply in breeding. We want to have an ideal and be building to it all the time. Now, in my own opinion every man must settle this thing for himself, but it seems to me that a man can do this work by associating with his neighbors in a more economical manner than he can do it by himself. I want to say that the Department of Agriculture are vitally interested in this matter. We believe it is one of the best things for the dairymen of this State that we can work upon, and we mean to devote our energies to the organization of these associations so far as we can, firmly believing that it will mean the introduction of a new era for dairying in this State.

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COMMERCIAL FEEDING STUFFS.

By Dr. Chas. D. Woods, Director Maine Agricultural Experiment Station.

[This address by Director Woods was practically a "black board" or "crayon talk." The composition of the different feeding stuffs and the calculations were written out while they were discussed.]

This is no new subject and I have nothing new to say upon it, but I would like to present some facts with which you are thoroughly familiar in a little different way, if possible, from what we have usually considered them. I want to show you as well as I can the way in which some of these matters in relation to feeding stuffs present themselves to me. I will try to illustrate on the sheet before you these things as I present them.

THE COMPOSITION OF CORN.

In the first place, if we are to look at corn from an economical standpoint, we must consider the substances of which it is composed. For instance, there is always some water in corn, no matter how dry we get it. It contains on the average, 11.3 per cent of water, but that water, so far as we are concerned this afternoon, has no particular value; it does not interest us. There are also certain mineral matters in corn. When we burn corn we always have something left,—some ash or mineral matter, just as when we burn wood in a stove there are the ashes left. There is perhaps 1.4 per cent of ash in the corn.

Corn contains some of that substance with which we are familiar because we have seen the word upon the packages of feeding stuffs which we have bought for the last ten years,—protein. We know that this is the building part of the food, and practically all of the articles that are used for food of man or beast contain this nitrogenous material we call protein. The protein in corn or corn meal is perhaps 10.5 per cent. on the average.

There is also the woody fiber which binds the other constituents together. This is very conspicuous, for instance, in the

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cob. There is not a great amount of fiber in the grain itself, perhaps 1.7 per cent.

Another constituent is what the chemist sometimes calls nitrogen-free extract. This is also called carbohydrates, although fiber, too, is a carbohydrate. It makes up the bulk of the corn, 70.1 per cent, and is very largely starch. As you know, the chief source of commercial starch is corn. The same starch is sometimes converted by the action of chemicals into glucose, and before we had pure food laws it often used to mask as something else.

In addition, we have one other component, the fat or oils. You know when corn meal is put into a bag and left for a few days the bag gets oily. This is due to the fact that corn contains quite a little or about 5 per cent of fat.

DIGESTIBILITY.

This makes up the 100 per cent, and gives the chemical analysis of corn. But that is only the first step in the story, as you well know. The measure of the food value of any food is not so much the amount of protein, fiber, nitrogen-free extract and fat it contains as the amount which the animal that eats it is able to get out of it. The amount of the constituents is found by chemical analysis. The proportion of these materials which is digestible has been found by feeding experiments, the so-called digestion experiments. The materials that interest us most in the foods which we shall consider today are protein, nitrogen-free extract and fat, or carbohydrates and fat. We will include the fibre, which is not very digestible, as a carbohydrate.

Now, in connection with corn, we wish to know about its digestibility. In the case of the protein, perhaps on the average 68 per cent of the 10.5 per cent contained in the corn is digestible. Of the nitrogen-free extract, or carbohydrates, about 95 per cent of the 70.1 per cent is digestible; the animal is able to get nearly all of it. Of the 5 per cent of fat, 92 per cent is digestible.

Hay tells a little different story. Take, for instance, timothy hay. The protein of that is only 47 per cent digestible; the fiber is something like 52 per cent digestible, the carbohydrates 62 per cent, and the fat 52 per cent. I have not given you the

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analysis of the hay, but supposing it to have the same analysis as corn, you will see that it is not nearly as available to the animal, because it is not as digestible.

Now I will go through the same process with cottonseed meal. We will take a high grade, which we will assume to contain 45 per cent of protein. In the high grade cottonseed, 83 per cent of the protein is digestible, 96 per cent of the carbohydrates, and 100 per cent of the fat. In a low grade cottonseed meal only 72 per cent of the protein is available, 68 per cent of the carbohydrates and 90 per cent of the fat. Another illustration of "To him that hath shall be given." That which is good is good in two ways, not merely from its chemical composition but also from its availability.

COMMERCIAL VALUE OF PROTEIN AND CARBOHYDRATES.

I have passed very quickly over those elementary lessons in chemical composition and digestibility, which you all know. We have talked about fertilizers and their cost, and we can talk in a fairly intelligent manner of the cost of a pound of potash, phosphoric acid or nitrogen in our fertilizers. Today I would like to talk about the cost of the nutrients in different feeding stuffs. While I have tried to get the average market prices from both the retail and the wholesale dealers, by ton lots and by carload lots, what I am more interested in than the price per ton is the price per pound of protein, nitrogen-free extract and fat. And because I want you to follow me and be able to work these problems out after you get home, I did not prepare charts, but will make them as we go on. Now what we want in the first place is something that we can take for a unit. Every spring the directors of the New England experiment stations get together somewhere, usually at New Haven, sometimes in New York and sometimes in Boston, and by carefully comparing the data which they have collated relative to the retail prices of the materials which go to make up commercial fertilizers—nitrate of soda, tankage, acid phosphate, etc., they derive what they call the trade values for phosphoric acid, potash and nitrogen, as they have sold in the markets in different forms during the preceding three months. I wish to find in the same way, if possible, some standards that we can use as a basis for our work.

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TRADE VALUES OF PROTEIN AND CARBOHYDRATES.

There are three feeds that are eminently common in Maine. Corn meal practically every farmer uses. If he does not buy it he grows it; if he does not grow the corn and grind it into meal, he feeds it in silage. Practically every feeder uses hay and most of them use ordinary mixed hay; timothy, redtop and clover. And nearly every feeder who is represented here uses cottonseed meal or something like it. While there are many farmers in the State who do not use cottonseed meal, there are many more who do use it. Corn represents, when we go to market, the standard article in carbohydrates; cottonseed meal represents perhaps the cheapest source of protein; mixed hay represents the standard of the articles which we produce upon the farm. Now let us see if we can find the cost of digestible carbohydrates, digestible protein and digestible fat in these articles.

THE COST OF CARBOHYDRATES IN CORN MEAL.

First, the cost of digestible carbohydrates, or nitrogen-free extract, in corn meal. Corn will carry about 6 per cent of digestible protein, 65.2 per cent of digestible carbohydrates, and 3.1 per cent digestible fat. One fact we have not stopped to consider, although you know it. You remember that a pound of fat when it is burned (and about all of the use of the carbohydrates and fat in the body is for burning) will give off 2¼ times as much heat as a pound of starch when that is burned. Consequently it is worth for fuel 2¼ times as much, and for the sake of simplicity we will try to get rid of the fat by converting it into carbohydrates. The 3.1 per cent of fat in corn meal will then be worth 3.1 times 2¼, or, roughly speaking, 7 per cent of carbohydrates. Add this to 65.2 and we have 72.2 equivalent carbohydrate material. As you see, we have only a little protein in comparison with the carbohydrates. If you will allow me to assume a value for that, I will assume that the 5.8 pounds is worth 2.7 cents per pound or 15.7 cents. This is, roughly speaking, the value of the protein matter in corn meal. It is pretty hard to make a guess at the price of corn today. The last time I purchased, it was worth about $29 per ton, or $1.45 a hundred. The protein in 100 pounds, at the assumed price, is worth 15.7 cents, and that will

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leave us $1.293 for the 72.2 pounds of carbohydrates. Dividing $1.293 by 72.2 we will get about 1.8 cents as the cost per pound of the carbohydrates. We may therefore assume that the digestible carbohydrates in the most common form in which we buy it, costs us 1.8 cents per pound.

THE COST OF PROTEIN IN COTTONSEED MEAL.

What about the cost of protein? Let us look at cottonseed meal. We will take the ordinary choice cottonseed meal, 41 per cent of protein guaranteed. We have only two grades this year, choice and prime, choice 41 per cent protein, prime, 38.5. Everything below that is off meal. The 41 per cent meal will have about 34.9 per cent of digestible protein, 18½ per cent of digestible carbohydrates and 8.8 per cent of digestible fat. Remember that the 8.8 per cent fat we multiply by 2¼, and we have the fat equal to 19.8 per cent of digestible carbohydrates, which added to 18.5 makes 38.3 pounds equivalent carbohydrate material. Now as far as we know, these digestible carbohydrates are just as good as those in corn, where we have found them to be worth 1.8 cents per pound. Multiplying 38.3 by 1.8 we find that the digestible carbohydrates in 100 pounds of cottonseed meal are worth 68.9 cents. Cottonseed meal is varying considerably in price, but during November it retailed in ton lots at $32 a ton for choice, or $1.60 a hundred. If the carbohydrates are worth 68.9 cents, the protein in 100 pounds of cottonseed meal at $1.60 would cost us 91.1 cents. If 34.9 pounds of protein costs 91 cents, we will find that our protein is costing us just a trifle under 2.7 cents per pound, so that the value which we assumed for protein of the corn meal we find to apply also to our cottonseed meal. We have thus far established that in our concentrates, using the two most common feeds, corn and cottonseed meal, as a basis, digestible protein is worth 2.7 cents per pound, or was during the month of November, and digestible carbohydrates were worth 1.8 cents per pound.

THE COST OF CARBOHYDRATES IN MIXED HAY.

We have one other standard food, hay. We will take mixed hay, that is, a hay made up of timothy, redtop and clover, as we ordinarily seed in this section of the State. It will carry 4.7

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pounds of digestible protein, 42.9 pounds of digestible carbohydrates, and 1.3 pounds of digestible fat. We will count the fat in the usual way, although it does not amount to much. Converting that into carbohydrates by multiplying by 2¼ gives us 2.9, and then if we add it to the 42.9 pounds carbohydrates we have 45.8 pounds equivalent carbohydrate material. We will assume that the digestible protein in hay is just as valuable as the protein in cottonseed meal or in corn meal, and call it worth 2.7 cents per pound. The 4.7 pounds in one hundred would then be worth about 12.7 cents.

It is rather difficult to make a guess at the price of hay. Good hay is worth $18 perhaps in the markets, and you may call it $12 at the barns. Let us call it $15. In fact few men if any ought to sell any hay. Suppose a man sells $500 worth of hay, and promises that he will buy back $500 worth of fertility; he does not do it. I know a man who loves to play solitaire. I have watched him play, and I never saw him play a game without cheating himself. The most of us when we go to selling hay and buying fertilizer are like my friend.

We will assume that the hay is worth $15 a ton or 75 cents a hundred. The protein in it is worth 12.7 cents, according to our figures above, which leaves the cost of the carbohydrates in the hay as 62.3 cents per 100 pounds of hay, and that will make it about 1 1-3 cents per pound. That is, the carbohydrates which we buy in corn cost 1.8 cents per pound, and those which we produce in hay are worth about 1 1-3 cents per pound. That is pretty nearly the difference in value, but the cow has more work to get them from the hay than from the more easily digested concentrates.

We may then settle ourselves down to three prices: Digestible protein, 2.7 cents per pound; carbohydrates in concentrates such as corn meal, etc., 1.8 cents, and in hay 1 1-3 cents per pound.

THE COMPARATIVE MONEY VALUES OF DIFFERENT KINDS OF HAY.

If you have followed me and accepted my argument thus far, you will agree that we have here a means whereby we can go into the market and look over the feeding stuffs and see whether we get our money's worth or not, and where we can spend

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it to the best advantage. With that understanding, let us look at a few of the common feeding stuffs we are using in our dairy work. Timothy hay is worth in the market two or three dollars more than mixed hay. Is it worth that to us on the farm as a feed? Timothy hay contains 3.6 per cent digestible protein, 43.9 per cent of digestible carbohydrates, and 1.6 per cent of fat. This 1.6 fat is equal to 3.6 carbohydrates, which added to 43.9 equals 47.5 per cent of equivalent digestible carbohydrate material. We have found that the protein costs 2.7 cents per pound in the market, or 9.7 cents for 3.6 pounds. 47.5 pounds of carbohydrates at 1 1-3 cents equal 63.3 cents. This gives us 73 cents per 100 pounds, or $14.60 per ton, the value of timothy hay as compared with mixed hay. This timothy hay which is worth two, three or four dollars more in the market is worth no more upon the farm to feed our cows than the mixed hay, because it does not have more digestible nutrients.

You will pardon me if I go a little farther with this matter of roughage produced on the farm to feed with the concentrates. Clover hay is a very important crop in Maine. Every once in a while we get disturbed because we cannot grow alfalfa. If we could grow alfalfa as easily as we can grow grass, we should not find it any better for general farming purposes than clover, if as good. It will not fit into any rotation. It is not a short lived crop, and successful farming in Maine depends very largely upon turning the land frequently and having rotation crops. Alfalfa is somewhat richer in protein than clover, but here in Maine we have little difficulty in growing clover and it is a great crop for us. It contains 7.2 per cent of protein, 35.8 digestible carbohydrates, and 1.8 per cent of fat, which is equal to 4.1 per cent of carbohydrates, giving 39.9 per cent of equivalent carbohydrate material. Using the same factors, we find the protein is worth 19.4 cents, and the carbohydrates, at 1 1-3 cents, are worth 53.2 cents, making a total of 72.5 cents for the 100 pounds or $14.50 per ton, practically the same as timothy hay although it commands a much less market price.

What I wish to consider today is not the feeding value of these materials, but what they are costing us. The clover hay, with its 7.2 per cent of protein, is of course a very much better feed than timothy which has only about two-thirds as much

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protein. But I am trying to look at these feeds from the standpoint of the market price. If we should go through the same process with oat hay, we should find that it would have about the same feeding value, so far as costs are concerned, as mixed hay. It will come almost to $15 a ton.

Another feed which I wish to figure out with you here is corn silage, because we are quite apt to think that has very little value. I have taken for figures here, possibly a little unfairly, Maine yellow corn that will mature sufficiently to glaze. I have very little sympathy with sour silage, and as long as we use a corn that will not glaze in our latitude, we shall be liable to make sour silage. I have a friend in Connecticut who is allowing his corn to ripen. He picks the ears, then cuts the corn stover and wets it down, and he is getting a silage which he likes much better than when it is cut green.

Corn silage of the type I have mentioned will carry, in 100 pounds, 1.8 pounds of protein, 13.6 of carbohydrates and .7 pounds of fat. The fat is not worth much but we will call it 1.6 carbohydrates, which added to the 13.6 will give 15.2 pounds equivalent carbohydrate material. The protein, at 2.7 cents per pound, is worth 4.9 cents; the carbohydrates at 1 1-3 cents, are worth 20.3; a total of 25.2 cents. That is a little over $5.00 a ton. So that silage which we can grow, probably, for $3.00 a ton, when we compare it as a roughage with our mixed hay at $15 per ton, is worth $5.00. Do not get the idea that I am comparing feeding values; these are commercial values. If I were to figure out corn stover, it would be a little below timothy hay, about $14 a ton.

THE COST OF NUTRIENTS IN OATS.

I want to consider for a moment some foods we are producing on the farm. Oats will carry 8.9 per cent of protein, 50.1 per cent nitrogen-free extract, and 3 per cent of fat which is equivalent to 6.75 per cent carbohydrates. Adding this to 50.1 we have 56.85 per cent equivalent carbohydrate material, and multiplying that by 1.8 cents, assuming that in our grains the carbohydrates have the same value as in corn meal, we find that the carbohydrates in oats are worth $1.02 per hundred. Multiplying 8.9 by 2.7 cents, we find that the protein is worth 24 cents

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per hundred. The oats would then be worth $1.26, or $25.20 per ton, for feeding value. If we go to the market today and buy oats, they cost us $40. The serious problem for a man who has a large number of bushels of good, sound oats to consider is whether, when they are worth for him only $25 a ton as compared with corn meal and cottonseed meal, he had not better take them to market and bring home something else. I am not altogether sure but that he will make more money if he will take his oats to market and exchange them for something else, if he does not have to cart them too far and can trade them to good advantage. Oats are good feed, but for a man to think of buying them to feed to any animal except a race horse, at present prices, seems to be preposterous.

Ques. What is the comparative value of oats and shorts or bran?

Ans. As expensive as bran is, I do not think it is quite as bad as oats at the present time.

PEA MEAL.

There is another feed which we do not grow in Maine as we used and as we ought to grow it. I want to put in a word for pea meal. It contains 16.8 per cent of protein. See how it comes up in protein! It also has 51.7 per cent carbohydrates and .6 per cent fat, equal to 1.3 carbohydrates, which added to 51.7 gives 53 per cent in round numbers of equivalent carbohydrate material. Figuring that through in the same way, using 1.8 cents a pound for the carbohydrates, we find that it is worth $29 a ton to feed, as compared with corn meal at $29 and cottonseed meal at $32 per ton. And we can grow peas without any difficulty almost anywhere in Maine unless we happen to get too much warm, muggy weather, which might make them mildew. I think while the raising of peas to be ground has practically gone out of fashion it should be revived. Peas, oats and barley can be grown together and will make a good feed. I believe we ought to grow all the feeding stuff that we possibly can and peas and clover give the most protein of any crop.

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CHOICE VERSUS PRIME COTTONSEED MEAL.

Now I want to show you the value of prime cottonseed meal compared with choice cottonseed meal. The choice has 41 per cent protein and the prime 38.5 per cent. Figuring out the values in the way we have been doing, we find that prime cottonseed meal would be worth $29.70 a ton and choice cottonseed meal $32.60. There is a difference of almost $3.00 a ton, and the difference in retail price, in ton lots, is $1.00 and the difference in carload lots is 25 cents a ton. Why should we allow any dealer to sell us prime cottonseed meal?

These feeds are sold under guarantee, and they come quite well up to the guarantees. Ten years ago when I spoke at the Dairymen's Convention I told you of the law that went into effect the preceding October, and said I hoped the consumers in Maine would send all the samples of feeding stuffs they possibly could to the Maine Experiment Station to be examined, and we got a great many from our farmer friends, but the dealers were not much interested. The dealers have become intensely interested, and today while we get large numbers of samples from the farmers, we get five from the dealer to one from the farmer. They are trying to learn the quality of the goods they are buying.

We got some very poor cottonseed meal last year, but nobody in Maine was directly to blame. This meal was sold in our State in August for fall delivery, and the dealers could not foresee that there would be great storms on the Gulf and that cottonseed meal would advance in price and be poor in quality. Last year we had many shipments of "off" meal, but this year we are having almost no bad cottonseed meal. It is very bright and fine. The chief point to be looked after is to demand and see to it that your dealer buys choice cottonseed meal instead of prime.

We have cottonseed feeds on the market today which are worth about $19 a ton as compared with choice cottonseed meal. It is pretty hard to get at the actual prices of cottonseed feeds as there is no grading on them anywhere, but concerns in Portland, in whom I have confidence, said the best price they could offer would be $25 a ton in carload lots; and this for a cottonseed feed worth $19 in comparison with choice meal at $32.

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No farmer should think of buying this cottonseed feed for $25 per ton, as compared with $32 for the choice meal. Gluten meal we used to have, but we do not have much of it now.

GLUTEN FEEDS.

If there were in the market gluten meal such as we used to have, it would figure out $40.75 feeding value per ton. There are however gluten feeds in the market that if you must buy carbohydrates, will give you good values for the money, but I have always held that when a farmer went to the store for grain he should not go to buy carbohydrates but to buy protein. Most of the gluten feeds will carry about 24 per cent of crude protein, or 20.4 per cent of digestible protein, 49.8 per cent carbohydrates, and 9.1 per cent of fat, or 70.3 per cent of equivalent carbohydrate material. The large amount of fat brings up the equivalent carbohydrate material. The protein in 100 pounds is worth 55.1 cents, and the carbohydrates $1.265, which would make the feed worth $36.20 on the basis of corn meal at $29 per ton and cottonseed meal at $32, and it is selling today for $31 and $32 a ton. So if you must buy these carbohydrate materials, gluten feed is an economical form in which to buy them.

Distillers' grains would on the basis we have used be worth about $34, costing $33 in the market. Union grains would be worth $33, probably about what they cost.

LINSEED OIL MEAL.

Linseed oil meal guaranteed 36 per cent protein will carry 30.6 digestible protein, 38.5 digestible carbohydrates, and 2.7 per cent fat. The fat is equal to 6.1 per cent carbohydrates, which added to 38.5 gives 44.6 per cent equivalent carbohydrate material. On this basis we find that the linseed oil meal is worth $32.60 and it cost about $32 per ton. If you want to buy carbohydrates as well as protein, linseed oil meal is just as cheap at present as cottonseed meal. This is due to the fact that linseed oil is cheaper and cottonseed meal is much higher than formerly. Whereas linseed oil meal two years ago was practically out of the market because of its high price, it is now abundant in the market and there is no reason why it should not be considered an economical feed.

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WHEAT OFFALS.

Now we come to a class of feeds which we used to say we always must have, but I do not see how we can use them freely at present prices, and those are the wheat milling offals. Take wheat bran, which contains 12.6 per cent digestible protein, 37.5 carbohydrates and 3.2 fat which is equivalent to 7.2 carbohydrates, making 44.7 per cent carbohydrates. At the same prices at which we have been figuring, it would be worth $22.70 a ton, and it costs $30. The story with wheat middlings is not as bad. Wheat middlings carry considerable starch, and they would figure out $29 and will cost $30 for brown and $32 for white. So one could continue to use wheat middlings without being as reckless as when using wheat bran. We have today not only wheat bran but adulterated wheat bran. We have some on the market which, instead of carrying 15 or 16 per cent of protein, is guaranteed to carry only 12 per cent, and the little card that goes with it tells you that it is made up in part of ground corn cobs. The quotations from Portland place these goods, at wholesale, at $1.00 a ton higher than spring wheat bran, and they are being sold in Maine and men who have cows are feeding this! This material is worth about $22 on the basis we have used, and adding one-fourth corn cobs pulls it down to about $17, and farmers are paying the price of wheat bran for that!

Dr. SMEAD. I thought the wheat middlings were adulterated with terra alba and with corn cobs.

Ans. We have not found them so in Maine, but we may. It usually takes longer for the new adulterants to reach us. They are generally reported from the New Jersey or the Connecticut Station before they appear up here in Maine. We have not yet found goods of this kind, but if they are on the market they will probably reach us. We will try to look out for them when they come.

THE COST OF PROTEIN IN DIFFERENT FEEDS.

Suppose we wish to do what I have told you in times past you ought to do when you purchased grain,—buy the protein. Let us look for a moment at the feeds in the market with this in mind, neglecting all the other constituents. What does crude protein cost per pound in these different feeds?

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In choice cottonseed meal, carrying 41 per cent of protein and selling at $32 per ton, the protein would cost 3.9 cents per pound. In prime cottonseed meal, carrying 38 per cent protein, it would cost 4 cents per pound. In distillers' grains, as I remember it, it would cost 6 cents. In gluten feed (and you remember I showed you that if you wanted to buy carbohydrates as well as protein it was an economical feed) it would cost 6.4 cents per pound, considering the protein alone. In wheat bran protein would cost ten cents a pound, and in adulterated mixed feed it would cost 12½ cents per pound.

I have said, and I think I am ready to say again, that a farmer who has grown what he ought to on his farm has no right to go to the store and buy a concentrate that carries less than 15 per cent of protein. But this year I do not quite know what to say. There is a gentleman before me using sucrene feed, and he says he is getting good results by using it with cottonseed meal. He has the problem of having to lighten the cottonseed meal with something. I do not know that it is economical to use sucrene meal. It is quite an expensive feed when we figure it out as we have the other feeds. The problem before us that I do not quite know how to settle is what we are going to bulk our rations with, unless we use gluten feed, or distillers' grains, or something of that nature. I think I should buy cottonseed meal and either gluten feed or distillers' grains to mix with it, and see if I were not getting ash constituents enough. We do not know much about the function of mineral matters, but we know that the animal needs them. You are selling phosphoric acid and potash in the milk and you must get it from some source. Cottonseed meal and the other feeds carry these to some extent. I believe that in our buying we shall have to cut out the wheat feeds until the prices are down to more nearly the old normal. We shall have to substitute some of these other feeds.

Ques. Is there any danger in feeding cottonseed meal alone?

Ans. I should never dare to feed cottonseed meal straight by itself, as a grain. You could feed it on sileage with safety. I should hardly dare to use oil meal or cottonseed meal in sufficient quantities to balance up the ration, if I were trying to make a close ration, without having some other grain. But do not turn to protena or ground alfalfa. It is more expensive than

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any other feed. Merely because alfalfa is a fine word, we do not want to conjure with it. Nor do we want to buy oat hulls as the basis of a feed, and in most of the dairy feeds the oat hulls are there, masquerade them as they please. Most of these low grade feeds we have to shut out, for economy's sake.

Ques. I would like to inquire in relation to the so called Daisy dairy feed which has been sold in quite large quantities in Androscoggin County.

Ans. The manufacturers of the Daisy dairy feed are either putting up a very good bluff, or else they are honest and mistaken in their goods. They wanted to know how in the world it happened that we were such inexperienced chemists that we could not find more than 12 per cent of protein in the goods, where they had guaranteed 16 per cent. I sent them four samples which we had found to carry 13 1-3 per cent (the highest), and they found no more protein than we chemists did. Wherever we have found the goods I have directed them to change the guarantee or stop the sale. I think the matter will be straightened out.

Ques. What is the meal?

Ans. It is some oat hull refuse mixed with a wheat offal and other refuses. I do not think they are using much to bring up the protein.

Ques. How would that do to feed in the place where we have fed wheat bran?

Ans. It would be more expensive than wheat bran at $30, in my judgment. Unfortunately the price of most of these goods makes them as prohibitive as bran.

Prof. HILLS. We found a certain line of feeds pretty heavily laden with weed seeds. We found one brand which contained nearly 20 per cent of weed seeds, equivalent to three weeds for every square foot of a 100 acre farm. The man had bought and paid for these in a molasses feed. One of the molasses feeds had none, and in one or two of them the weed seeds were there but had apparently been killed in some way. In several of the brands, however, there were noticeable amounts of weed seeds, and I think it behooves a person who is buying that class of goods to make certain that he is not seeding his farm with weeds.

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Prof. WOODS. We had a sample sent up to us from a carload of oats unloaded in Bangor, and they carried 11 per cent of foul seeds, besides about four per cent of dirt.

Wednesday evening, at 8.30, the Sixth Annual Banquet of the Maine Dairymen's Association was served in Abou Ben Adhem Hall. This was an exceedingly pleasant occasion. Much credit is due to Mr. B. C. Brett, in charge of the arrangements, for the attractive menu and the excellent entertainment. The responses to toasts were full of pith and humor. The music by Dana's orchestra and the readings by the genial Prof. Dennett were highly enjoyed.

THURSDAY, DECEMBER 5.

A business meeting of the Dairymen's Association was held at 9 o'clock, President F. S. Adams in the chair. The report of the secretary was read and approved. The treasurer presented the following report, and it was voted that the same be accepted.

Balance from last year's account	$90 17	
Received from L. W. Dyer	69 45	
		$159.62
Paid Walter A. Cook, first prize December, 1906	$15 00	
Paid F. P. Comins, second prize	10 00	
Paid Albert C. Cooley, third prize	5 00	
Paid Chas. D. Woods, on H. C. Adams' fund	5 00	
Paid D. H. Knowlton, for music	12 00	
Paid bill for badges	10 60	
Paid L. W. Dyer, postage, stationery and printing	19 20	76 80
Amount now in treasury		$82.82

Officers were elected as follows: President, F. S. Adams, Bowdoinham; vice president, W. G. Hunton, Readfield; secretary, Leon S. Merrill, Solon; treasurer, Rutillus Alden, Winthrop; trustee, W. K. Hamlin, South Waterford; corresponding

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secretaries, R. D. Leavitt, Auburn; T. B. Bradford, Golden Ridge; W. W. Harmon, Falmouth; C. E. Wheeler, Chesterville; J. A. Peters, Ellsworth; Otis Meader, Albion; O. Gardner, Rockland; A. C. Fossett, Bristol; J. A. Roberts, Norway; C. L. Jones, Corinna; F. W. Leland, East Sangerville; B. M. Patten, Topsham; H. B. Ellis, Embden; E. C. Dow, Belfast; A. E. Lincoln, Dennysville; F. B. Pike, Cornish; member of Advisory Council of Experiment Station, Rutillus Alden.

A committee on resolutions was appointed by the chair, consisting of R. Alden, W. G. Hunton and W. D. Hurd.

The following series of prizes was offered by Dr. G. M. Twitchell, Auburn, to be competed for at the State Dairy Conference to be held in 1908: Best trace of yellow flint corn grown by a boy 18 years old or less, $5.00, $3.00 and $2.00. Best ear of yellow flint corn grown by a boy 18 years old or less, $3.00, $2.00 and $1.00. These prizes were offered under the following conditions: Only one entry in each class to be allowed an exhibitor; single ears exhibited to become the property of the association and to be sold at auction before the close of the Conference, on condition that the seed shall be kept by itself, planted away from other fields of corn, and that the party purchasing shall agree to exhibit a trace raised from this seed at the Conference in 1909, together with a full statement in regard to its growth. All exhibits to be conditioned upon the competitor furnishing at time of entry a full and complete statement of quality and kind of soil, amount of fertilizer used, and all other facts connected with the growth of this crop, that the information may be of service to others.

It was stated that the object of this competition was to stimulate interest among the young men on Maine farms, increase the corn crop of the State, and to produce in years to come a variety of corn known to produce vitality and hardiness, and thus by critical selection to secure a kind of corn especially adapted to our State.

Voted, that the matter be left with the secretary, who shall attend to the necessary details and call the attention of the people of Maine to the matter in any way he thinks proper.

A rising vote of thanks was extended to the retiring secretary, Mr. L. W. Dyer, for the efficient manner in which he had performed the duties of his office during his long term of service;

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also to Mr. B. C. Brett of Auburn, for the interest which he had taken in the Conference, the cordial welcome extended to the association and the fine entertainment furnished at the banquet, Wednesday evening.

The following resolutions were presented by the committee and adopted by the association:

Resolved: That the Maine Dairymen's Association recognizes and expresses its appreciation of the work done by Mr. B. C. Brett, in his effective, untiring efforts to make the present meeting the success that it has been.

Resolved: That in the retirement of L. W. Dyer as secretary of this association the organization loses an efficient and untiring worker, and that we at this time express our official appreciation of his work for the past twelve years.

Resolved: That the association again expresses its indebtedness to the press for the full and able reports of all its meetings.

Resolved: That we are under renewed obligations to the railroads of the State for courtesies received in connection with this meeting.

R. ALDEN,
W. G. HUNTON,
W. D. HURD,
Committee on Resolutions.

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CREAMERY MEN'S HOUR.

Address by E. L. BRADFORD, Manager Turner Center Dairying Association.

Great changes have been made in the dairy business in the last quarter of a century. Twenty-five years ago all butter was made at the farms, and as for cream, comparatively little was used in the cities. But as we go along, progress seems slow in comparison with so much that we can always see ahead to do, and we might exclaim in the words of Cecil Rhodes, "So much to do, So little done!"

The first four creameries started in Maine were at Wales, New Gloucester, Turner Centre and Winthrop. This was about twenty-four years ago. Soon after the factory started at Turner Centre, there came a telegram from one of our large cities "Ship immediately four cans of cream." This was our first "wire" and caused quite a sensation at the Creamery when it was brought in by the president of the company. It was soon decided that the word "butter" had been omitted by mistake in copying. Of course the man did not mean "cream." But there was the word "cans"—"four cans of cream." We used tubs for our butter—had no experience with packing butter in cans. After much deliberation it was decided that the order was altogether too indefinite. It came from a stranger and perhaps he was trying to bunco us, thinking we were green, as we had just started in business. We would let him know we were not to be caught that way and so the matter was dropped entirely.

Since that day we have come to know what a man means when he wires "Ship immediately four cans of cream."

Such messages are now received and executed without any palpitations more than are caused by the necessary exertion.

In the spring of 1890 butter reached a very low figure. We were then selling some cream in Lewiston and Auburn and had one customer as far away as Portland. It was easy to see that cream sales paid very much better than butter at the low price at which butter was selling. I determined to try Boston for cream business. The first two parties I visited were interested in the proposition but were skeptical of success in sending cream

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so far. Having secured orders for forty gallons per day I hurried home to get some cans and boxes made. The trial proved a success and since that time, the sweet cream business has gone marching on.

A few years later we began to pasteurize and separate thin Cooley Cream in order to get thick rich cream for table use. This gave skim-milk in about the proportion of three of skim to two of heavy cream—so called.

This popular term "heavy cream" is misleading. The cream to which the term is applied is lighter by actual weight than so called "light cream."

A dozen years ago, or so, a certain grange appointed a committee to weigh a pail of cream and a pail of milk to see how much heavier the cream was than the milk. The report was duly made and accepted that the cream was a certain number of ounces heavier than the milk. Perhaps a pail of cold cream was weighed in comparison with a pail of warm milk with some foam on it—to give this remarkable result.

The little matter of temperature could easily be overlooked in so crude an experiment. I was once taken severely to do by a customer who claimed that our heavy cream was not up to standard. He had weighed a quart of it in comparison with another brand and found ours not so heavy as the other.

The phenomenon of cream rising to the top of milk has been explained as due to "natural" cause. It was "natural" for fat to rise, just as it is "natural" for hot air or for a balloon to rise. Now it is not "natural" for anything to rise unless compelled to do so. Imagine a balloon sailing high in the buoyant atmosphere. If the atmosphere should be suddenly and entirely removed, the balloon would drop to the ground as rapidly as if made of solid lead.

Cream does not rise on account of any inherent tendency to do so. But the heavier part of the milk presses to the bottom and says to the lighter cream in the language of the theatre ushers "Rise please." If I should fail to obey the usher a policeman would take me by the collar. If cream should disobey, along would come a separator man and say "I can snake it out for you—save the cost of the machine in sixty days—to say nothing of having nice warm milk to nurse the young stock"—you all know their story.

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Now to return to the point where we began to separate thin cream. I could see no reason why this skim-milk should be particularly different from any other skim-milk.

When a milk man starts out to peddle milk from cans that have been filled for any length of time, he knows he must pour them over in order to mix in the cream which has risen.

It appeared to me that it would amount to the same thing to mix in right proportions cream and skim-milk that chanced to be in separate cans as result of a pasteurizing and clarifying process. I tried it in a small way, calling the product whole milk and it seemed to be all right. It was pleasing to the taste and showed a good analysis. After a while the Lewiston Journal commented, not unkindly, upon the fact that the Turner Centre Creamery was selling milk, although it bought none. Presently from another paper came this squib:

"I would have Mr. Bradford understand that it takes something besides butter fat and water to make milk." That was true and well meant but hardly apropos.

Naturally enough, the local milkmen took up the hatchet and fearing you may infer that they succeeded in getting my scalp, I hasten to explain that what you see, or rather do not see, is the result of heredity and that my warlock is not dangling at the belt of any local milkman.

At the present time I think we must be good friends, for I do not read of any mass meetings held for the purpose of our overthrow. I like to be "good friends" with everybody. I *am* —speaking for myself, though I don't like all the *ways* that some people have.

Knowledge, experience and facility in thus saving for the peoples' use a much needed article has been of considerable economic importance in the last ten years.

About ten years ago, when the policies of the Turner Center Dairying Association were under special consideration by the management and no less by a large division of its patrons, it was asserted by a prominent authority that "The profit of the cream trade is fast vanishing. It is being constantly reduced by increasing competition."

Reference to our annual report of ten years ago shows that our cream and milk sales were then some over $121,000. For the current year our sales of cream and milk will amount to

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fully five and one half times what they were ten years ago. Our pounds of butter made have not increased 50% over what they were ten years ago. During the past summer we have shipped an average of fifteen carloads of milk and cream per week to our distributing stores and customers. We have a large demand for buttermilk and for the past few weeks, our entire make of buttermilk has been required for shipping so that we have had to rob our trade of a little milk for a few pigs which we keep under the stable. Other creameries in the state are tending the same way—first from butter to sweet cream then to milk.

With the increase in population in the eastern cities of New England, Maine is bound to be called upon for a supply of milk. I hope the creamery-men and producers in Maine will so far co-operate—work together with intelligence and fairness—as to avoid such senseless and wasteful wars as we have seen waged between contractors and producers in Massachusetts.

War is justifiable when it aims at the destruction of evil and the establishment of good. War is justifiable against noxious insects, slavery, rum or even the little wars of creamery-men against slovenly and careless handling of that most delicate and perishable article of food, milk. The Boston milk wars appear to an onlooker more like wars of plunder, to see which side can carry off the most dollars, regardless of justice and fairness.

In the meantime the people pay the charges and get no benefit. The trouble is that the farmers do not know the contractors' side of the matter and are suspicious that the contractors are not paying them fair prices.

President Roosevelt has advocated publicity as a specific for corporation evils. When our honored president was punching cattle in the wild west, the Turner Centre Dairying Association was quietly and as a matter of course, sending out annually to each of its patrons a report of the year's business. I don't suppose the president got his idea from studying Turner Centre Creamery methods, but the case might be quoted as illustrating the saying that "Great minds run in the same channel."

I hope the president will not be puffed up with pride when he gets his next Evening Journal.

Careful and systematic office work and up-to-date laboratory work are matters to be looked after by the creamery man. If

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a can of cream springs a leak any workman who chances to be near can put his thumb over the hole and pour the contents into another can. But there may be leaks going on of quite as great importance though not so apparent. Take the case of water content in butter. There are reasonable limits to the percentage of water in butter. It is unwise and dishonest to saturate butter with all the water it can be made to carry. On the other hand it is the height of stupidity to work butter excessively dry when consumers do not like it so well.

Suppose I have in my worker a batch of butter that is properly worked and contains, say, 14 or 15 per cent of water. I now carelessly let the worker run until I have worked out water to the extent of 2 per cent of the weight of the butter. That is easily done—being only one-third of an ounce to each pound. What is the result if that occurs with all of the butter made in one year by our company? If we have 2 per cent less butter to sell we have 2 per cent less income for butter. Last year our income for butter was practically $500,000.00, 2 per cent of which is $10,000.00. $10,000.00 which might stupidly be allowed to run down the sewer. Now it is not cheating to prevent that loss. The consumer prefers to have the butter with the water in it—a proper amount.

If you should ask your fruit dealer for a nice apple, you would not appreciate it if instead of a nice juicy apple for your penny, his conscience should prompt him to hand you two dried apples. The amount of water in butter will be determined by the observation of the butter maker, but his observation can be trained and checked by laboratory work.

Careful watch should be kept for butter-fat in skim-milk and buttermilk. Per cents of milk and cream should be adjusted accurately to the standard set. All of these things are within the range of the every-day creamery man's knowledge.

The more advanced investigations for bacteria, pus and dirt are probably matters for expert work and we should have at least one laboratory in the State devoted to such research.

The individual can system is the first requisite for such investigations and I am thankful to say that step has been taken by our association. Under this system every patron's product is available for investigation at any time. Knowledge of this fact

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alone by the patrons is enough to make the system a great success.

When we were about to start the system at our Turner Centre factory, an old schoolmate and friend of mine called on me to ask certain questions about the care of his cream at home. He said he didn't want any trouble found with his cream. Good care of the cream is not alone promoted but also good care of the cans, under individual ownership.

A can manufacturer told me that he was once showing a Boston milk dealer a very fine strong can for car use. The dealer said he did not want it. The cheapest cans he could buy were good enough for the farmers to carry out into the field and leave there. I wish, however, that the cans we get for our patrons were better than they are. The tin plate is bad. Sheet steel is used, which is flaky. When the plate is bent the flakes snap off taking the tin coating and leaving an exposed place which soon rusts through.

Occasionally we see an article published unfavorable to pasteurization, claiming it is used to cover up defects, that it renders milk less digestible, etc. As to the chemical effect of pasteurization I am no judge. My observation is that a person accustomed to pasteurized milk finds it pleasanter to the taste than raw milk. As to its use to cover up defects, such is not the case in my experience. I understand that pasteurization destroys any disease germs that may be in milk, which is certainly a desirable thing. It retards souring which is of great use where milk is brought to market from remote sources. I do not pretend to have much knowledge of dairy practice in other states, but I do know that State of Maine cream and State of Maine butter stand high in New England cities.

From this it seems probable that Maine creamery men have been comparatively diligent and persistent in requiring of their patrons a high standard of excellence in their milk and cream. This high standard of the raw product supplemented by pasteurization, has achieved success for Maine cream. I think we need not worry over complaints against pasteurization.

The subject of tuberculous cows is unquestionably the most difficult one that confronts the dairymen and consumers of dairy products. It would still be a difficult question if we knew just

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what ought to be done, as we do know in the matter of dirty and careless handling of milk.

I do not think I am faint hearted when I believe that I know the right of a matter. But I am free to say I don't feel that I know just what ought to be done in the matter of tuberculous cows. I am inclined to wait for the people to say, through the legislatures or boards of health, what they want. Only let there be uniformity in requirements and creamery men need have little trouble in carrying such requirements into effect. Price will do it.

Inspection of cream and milk as it arrives at the factory is a matter of no small responsibility. It must be done without fear or favor, and at the same time much care and judgment must be used as well as a keen and practical taste.

To a person not familiar with it, it is remarkable to see a man rapidly tasting of hundreds of cans of cream and milk. In warm weather we find three to four cans in 100 that are scored "defective." Not much of this is really bad cream—but from one cause or another it is not up to our standard of excellence required. Of this defective cream perhaps more than one-half the producer expects to be scored down. The patrons may not use ice or may not send on frequent and regular days.

Next in amount is cream sent by people who really mean to send good cream but perhaps do not know just how to handle and care for it, or may have a low standard of cleanliness.

Lastly are some cases where it might be difficult for a very intelligent person to discover the cause of the trouble and doubtless there occur mistakes or misjudgment at the factory.

In the last two cases patrons are likely to complain at their discounts more or less bitterly according to their temperament. But a system of inspection is indispensable and we try to make it as reliable as possible. We keep at hand a chemical test for acidity to verify the taste of the inspector when deemed desirable. A novice at tasting cream is apt to get lost after tasting a few samples. A small bite of apple will clear the taste.

As winter approaches we try to have our milk and cream kept from freezing. Not that it injures milk or thin cream so very much to freeze but it is troublesome to handle at the factory in a frozen condition. It has to be carefully thawed before it can be poured into the weigh can and sampled properly. Much

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can be done by gatherers to prevent freezing by blanketing their loads well and using one or more lanterns among the cans.

One thought more and I will close.

Milk—fresh, pure, sanitary; food for babes, food for the sick, food for athletes, the best and most perfect food for all. How shall the people get it in the most perfect condition?

Along a line of railroad, establish colonies of cows at the most feasible points. Let the barns, yards, store house, milk house and all be most carefully planned and constructed, to give a sanitary, comfortable, convenient, sightly plant. Put a highly educated and trained manager in charge of a suitable number of these colonies. Let everything about the work be done in the most approved and up-to-date manner. Let a day's milk be taken to market on night express trains. Grain from the west would require no carting. Hay could be hauled from the nearby farms and manure hauled back. Keep at the colonies only cows in full milk. Send the young stock and dry cows to the more remote farms. Think about it.

L. S. MERRILL. I have been interested in this paper by Mr. Bradford for quite a number of reasons: First, because of his long experience in such matters and the progress that has been made by the company which he represents. I have been interested because he has always stood, as a man and as a creameryman, for progressive methods; because he recognizes the needs of the dairy interests, so far as selling milk or cream to the creameries is concerned. I think every creamery man can say with him that it has been an up-hill road they have been traveling, and still they have been able to see progress made all the time. I think we have reason to feel proud of the progress that has been made along the lines of quality in this State, especially during the past ten years. In the last few years, since the sweet cream industry was started, a great work has been done along the line of the care of milk and cream by the average dairyman, by men who are furnishing cream to the creameries, and there is a work still further to be done. The next progressive move, as I indicated yesterday, must be better products, and it is practical improvement that the creamerymen stand for, and that the Department of Agriculture stands for. We hope to bring to the farmers, the dairymen of the State, practical

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plans for helping out their product, things they can do in a practical, inexpensive manner, that will produce better results. I think the individual can for collecting cream will tend to produce better results, and that it will be more economical for the farmer in the long run. He has to pay for the cans anyway, and it is just as well, and better, that each man should pay for his own cans. Then, again, there is an individuality to that cream as it comes to the creamery. When it is pooled with other cream that individuality is lost. Every man has to stand behind his own cream and it has to be judged upon its own merits. I believe in progress. I believe we should all take hold of these good things and push them along. They mean a better product and they mean better prices. I do not always like to talk on the dollar side of the question. Sometimes my very soul revolts against talking so much upon the dollar that comes in return. It seems to me that we should have a further incentive, that every man should strive to improve all the time because it is improvement, and because he should stand for something better in life. I think this matter is something that our people should co-operate in. There has been a better feeling brought about all over this State between the producer and the man who handles his product. They are coming to know each other better, and we cannot know the people with whom we are doing business any too well. It means more peace and satisfaction, because when we work together it always brings better results.

W. K. HAMLIN (So. Waterford). I feel very much interested in this work. I am particularly interested in anything along the lines of improvement, and the thing that appeals to me most just now is this matter of testing herds of cows to find out exactly, or pretty nearly so, what each individual cow is doing. From what I have been able to learn about this, it seems to me that it is the next great work, for the dairyman at least, and I am particularly anxious that this work may start over in our locality. I would like to have the name of having a hand in starting the movement in this State. I was very much interested in Mr. Bradford's paper. At our place we do not sell any cream, we manufacture our cream into butter, and we do not go into any expensive ways of killing the germs in the cream. We really do not have very much trouble. We are in

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a remarkable section of country, away back in the woods in Oxford county; the feed is sweet and nice on those hills and the cattle do not lack for exercise. We do not have any tuberculosis to amount to anything. We have an exceptionally fine lot of patrons at our creamery, they are interested in the work, their cream is kept nicely and comes to the factory in fine shape. We have never adopted the individual can system. I think it is a good idea, with some creameries, but we have not felt the need of it yet. The patrons are all neighborly and kind, and if you meet them they do not look as though they were afraid of looking you in the face.

T. M. Davis (So. Paris). I have nothing to offer this Association. I came here to learn, and as I have just arrived this morning I am scarcely in a position to speak with any intelligence. However, I may say that Brother Hamlin and I are neighbors in the creamery business and what he says in regard to the patrons of his creamery I think I can truthfully say in regard to the patrons of the creamery which I represent. We find them remarkably careful in handling their milk and their cream. Of course we are in closer touch with our patrons than some other creameries of the State. The cream comes directly into the creamery and if there is anything wrong with it by some observation and a little detective work we can very easily locate the difficulty. Occasionally we have cream that is not up to our standard, but by making inquiries, as I said before, we can very soon locate the matter. In regard to tuberculosis, almost all the patrons have had their cows tested. Our cream and milk, and most of the butter also, are sent to the City of Portland, where it is required that the product should be from tested cows, and consequently practically all of the patrons have had their cows tested for tuberculosis. We have not yet taken up the plan of individual cans. As we are in pretty close touch with our patrons it seems unnecessary at the present time. Still, we are in favor of anything that will be for the advancement of the creamery interests and are glad to see that new ideas are brought forth year by year. The new methods which I may learn at this meeting I shall take home with me and study and if we find it practicable we shall work along those lines.

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J. B. McEDWARDS (Livermore Falls). I was very much impressed with what the gentleman said in regard to cow test associations. I think that one of the best things that Maine dairymen can do is to have the individual cows tested. I have made some experiments along this line with a few of our patrons, asking them to bring in samples of milk at different times from the different cows, and testing them at the creamery, and in every case, without exception, the farmer had made a mistake in the quality of the milk from the individual cows. Cows that he thought gave the richest milk were not the best cows. I think it would be a great thing if we could start these cow test associations in different sections of the State. Where I am located, we would be willing to test this milk from the individual cows free if the samples were brought to the creamery, marked correctly, because it is not much work. We have to test a lot of samples the first of every month and it would be a small matter to test 10, 15, 20 or 25 samples more. Thirty-two samples will fill our tester and we can run them through in less than an hour. I think the information the farmer would get from this would be very valuable.

Another important matter with regard to dairying in Maine, which I think perhaps ought to be attended to before the cow testing, is the stable and tie-up testing, keeping the filth out of the milk. Milk from a cow that is perfectly healthy is almost sterile. After rejecting the first two or three streams from the udder, it will keep almost indefinitely if it is kept sealed up, away from the air. It is the bacteria, the dirt from the clothes of the milker, from the udder of the cow, and the dust of the stable, that sours milk. Prof. Gurler of Wisconsin has made tests in this line with some of his cows. Some of you are familiar with his work. He took some healthy cows, washed the udders with water with a disinfectant in it, and milked through sterilized cotton, rejecting the first two or three streams, and the milk kept many, many days, I think 16 days, without any perceptible acidity. This shows that milk free from dirt will keep a long time. The trouble with a great many Maine stables is that dirt gets into the milk and makes defective cream. We have to churn it into butter, because the sweet cream is used for shipping purposes, consequently the butter is not of as high quality as it would be if the filth were kept out.

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If the man who is employed by the cow test associations could have authority to speak on these subjects, I think it would be beneficial. The trouble in Maine is that if you go around to your patrons and tell them that their tie-ups are dirty and the cows in bad condition, they are inclined to think you are a little too fussy, as they all think they are clean, and they will send their cream to another creamery. There ought to be some way of stopping this. Out West if cream is rejected by one creamery it is not received by another. I do not know as that could be done here, as there is so much competition. For my part, if another creamery refuses cream that is in a filthy condition I will refuse it if I know it, and I have done so. We have had samples of cream taken from our teams that contained bacteria far in excess of the 500,000 limit. There is a fine if the cream contains more than 500,000 bacteria to the cubic centimeter. I have seen samples that contained 3,000,000 germs to the cubic centimeter. I am glad to do anything I can to promote the creamery interests. I think the system of individual cans is the right one and I am going to adopt it as soon as possible.

A. W. GILMAN. I have been very much interested in this discussion. Indirectly, if not directly, I am one of the creamerymen. Finally some of their puzzling questions come to me for settlement. When I first came to the Department of Agriculture, very many men were sending in complaints. They did not believe they were getting their just dues, and asked me how they could get what belonged to them, or something along that line. It is very gratifying to be able to state that within the last two years I have not received a single complaint from any man who is selling his product to these creamery men. That is a great step along the line of a union between the producer and the manufacturer.

I am very much interested in this question of cow test associations. I firmly believe in them, and I was certainly strengthened when Brother Hamlin said he wanted the movement to start over there in his section. I saw in a moment what an impression that had upon Senator Alden. He told me this morning that he was going to have the first association in his section, which is the home of the dairy cow and where one of the butter factories is established. He said, "I have been

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giving this matter a good deal of attention. I believe in it; I believe it is the right step towards helping out the man on the farm." You know it requires a great deal of effort to run a dairy successfully, and farmers now, some of them, are beginning to think they could get a living easier if they went into sheep husbandry instead of giving so much attention to dairying. Now I believe it is the duty of this Dairy Association, with the Department of Agriculture, to show the farmers of Maine that they can get more out of the dairy cow than they have ever received before; but that can be done only along the line of advance. Some man has suggested to me that he thought he could test his own cows and thereby save the expense of the association, but I am satisfied, myself, beyond a doubt, that that is not the best way, because the farmers are more or less like myself, they have lots of business to attend to and cannot attend to everything. Then, again, there is a kind of feeiing existing that every man does not know how to take a proper sample of his milk. He wants his cows to appear as well as his neighbors, and he will lean a little towards taking the sample nearer the strippings than the first of the milking. But when a man under pay has charge of the whole, and is intelligent about it and carries on a year's experiments, we shall know more about the individual cow than we now know. I believe in this work. I believe Prof. Hills said that Maine was ripe for this movement, was in better condition to do the work today than any other New England state. And if we have the opportunity and the ability, why should we not see to it that it is done now, before the dairymen slacken up on the dairy product and adopt something else, as sheep husbandry, that they can carry on with much less labor.

There is another work that has been spoken of here, the taking of a cow census. Much good has been derived from this in other sections, and why should we not turn our attention to it, here in Maine. Some of us think,—well, the farmer will do it himself. I tell you, being a farmer all the days of my life and being connected with these men, that we shall never do it unless it is carried out along this line of which we have been speaking. When somebody comes along and calls our attention to it and says, There is a way for you to receive more, do more, and be better men along this line of work, we shall take

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hold of it with earnestness. I am perfectly willing to part with a dollar if I could have this work done; I could earn a dollar in the time it would take to do it. Then, again, the results would not be worth much to me if every individual man took his own sample. Some of them who were perfectly honest and sincere would know but little about how to do the work.

Speaking of the sanitary conditions of the stables, the people who run the condensed milk factory at Newport called me in last year and said, "What are you doing, Mr. Commissioner? The law says you shall inquire into the systems and the methods of butter making. We employ one man all the time to visit every stable and inquire into the sanitary conditions of the tie-up, and investigate the feed and the care of the cow. What is the whole great State of Maine doing?" When the pure food law first went into effect I had a consultation with Prof. Woods and we agreed that a system of education should be carried on, that we would educate the people along this line of work and when education ceased then the law would be put into force. There is something to be expected of us every year, in the way of a purer and better product, just as much from the farmer as from the commercial man.

CLEANER MILK—WHY—HOW.

By Dr. G. M. WHITAKER, Dairy Division, U. S. Department of Agriculture.

The thought now most prominent in my mind does not relate to dairying but to the magnitude of our nation and its wonderful resources. Your invitation to address this meeting reached me in the new State of Oklahoma, while I was observing with amazement the miraculous growth and reflecting upon its tremendous future possibilities. Oklahoma City, its leading municipality, has no suggestion of crudeness or pioneer life—but rather has the earmarks of a city that has been growing for 100 or more years; a city that would compare favorably in every respect with any New England city. And yet all of its business, educational, social and religious development has sprung up from the bare prairie in eighteen short years.

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My return trip East included visits to other western cities, each growing rapidly and yearly becoming of more and more importance. In the Mississippi Valley I found almost every one talking about the value of utilizing the great Father of Waters as an immense thoroughfare for the transportation of agricultural products from the farms of the Central West to export points at tide water. One cannot travel to any considerable extent in the United States without being overwhelmed at the immensity of our nation, its phenomenal growth and its unimaginable possibilities.

But all this wonderful advance appealing so loudly both to national pride and to loyalty, has a serious side for a native New Englander. With the development of the West, with the making a great thoroughfare of the Mississippi, with the addition of new States, the East is losing and will continue to lose its relative importance.

Though the population of New England may increase, though manufacturing interests may grow, though commerce and exports may hold their own, though agriculture may develop and become more profitable, this section—territorially so small by comparison—must retrograde relatively in amount of business done and in national influence; the future has much uncertainty for us. As in the growth of New England the development of manufactures meant loss of prestige to the hill towns—so national growth must be accompanied by shifting of centers of activity and influence.

But pessimism is unnecessary. Though changing conditions may jar our pride by lessening our opportunity to use the big adjectives in boasting of our great importance nationally, New England will continue to offer increasing opportunities for good homes, profitable occupation and lives of usefulness.

Possibly the outlook is even better than that. As the great western country becomes more closely populated and its cities more numerous with more non-producers to feed, there will be a home market for increasing amounts of the farm products of that locality (especially those of the dairy) and it may be that in the future our competition with western butter, beef, and other articles will gradually grow less and New England producers will have their home market more entirely to themselves.

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New England has one distinctive advantage which can never be lessened either absolutely or relatively—that is the incomparable beauty of her natural scenery in its kaleidoscopic panorama of seashore, lake, mountain, and valley, and the tonic salubrity of its summer climate. I have been surprised on reading the society news in the D. C. papers, at the time for the annual summer vacation exodus of judges, ambassadors, congressmen, cabinet officers, chiefs of bureaus and divisions and others, to see how many go to New England.

In this New England has a valuable asset that never can be taken from her, and which will become more and more valuable as the country becomes more thickly settled and the demand for vacation homes increases. This asset should be carefully protected and preserved—for many obvious reasons—not the least of which is its bearing on the demand for choice dairy products.

But to turn to more direct dairy subjects: The demand for cleaner milk has been a familiar sound in my ears for a long time. Years ago, when connected with the Massachusetts Dairy Bureau, I planned several dairy institutes for the especial benefit of the creameries, which were continued successfully until abandoned by direction of the State Board of Agriculture as conflicting in a degree with the Board's Institutes. At these meetings, more cleanliness of milk and cream was a frequent theme. Buttermakers complained that they could not make Number One butter if even one farmer in twenty furnished dirty cream. Sometimes this careless man would be an influential director, and the salaried buttermaker was powerless to reject the cream from the man who employed him. The need of state dairy inspection was discussed; a more rigid oversight of the dairies and a putting out of business of those who would not produce cleaner milk or cream was urged.

More recently the subject of cleaner milk has come prominently to the front all over the country, and a careful inspection of dairies has been started in many places. This comparatively new movement has been inaugurated largely by physicians rather than dairy leaders; its official machinery has been put in operation at the instance of health boards rather than agricultural departments; and its object has been a better market milk supply rather than a higher flavored butter—though cleaner milk helps one as well as the other.

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This modern dairy inspection and the necessary rules incident thereto are not in general favor with milk producers, the opposition ranging from quiet criticism to open and organized revolt. This attitude is greatly to be deprecated because in the first place it is sure to end in defeat, even though temporary success be gained, for the agitation in favor of cleaner milk is based on proven facts, and truth must prevail. Further than that, these milk producers place themselves in a false light before the general public by facing backward rather than standing in the line of progress.

I have, however, much sympathy with the farmers who are skeptical as to the new-fangled milk regulations, and their feeling has several good reasons for existence. It is natural that such a movement originating largely outside of agricultural circles should be viewed with suspicion. Then besides it is a principle of law and logic that the presumption is always in favor of the existing order of things and the burden of proof is on those who would make a change; but many health officers know so well the danger from contaminated milk that they have not taken time to make plain to others what they see so clearly themselves, and have made radical regulations without taking the producers into their confidence. In addition, the enforcement of these orders is sometimes given to people lacking tact and dairy experience, and employing unwise methods, which tends to increase friction rather than to allay it.

Milk producers, as a rule, are reasonable, intelligent people who desire to produce a proper article. But they don't understand why customs and conditions which have been approved for generations should suddenly be forbidden; the *why* of things should be explained to them. They can be led better than they can be driven. They should be approached in a friendly and helpful way rather than with the bearing of a policeman, which will surely beget a spirit of antagonism.

Last winter, I heard a prominent member of the Massachusetts Board of Agriculture, who has been an intelligent, successful milk producer, condemning before a group of farmers the state board of health because an inspector, half his age, had criticised him for straining milk in his barn. I said to him substantially this: "Your experience as a milk producer, and your prominence in the Board of Agriculture, place you before the

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farmers as a leader and they have a right to look to you for advice. Now, knowing average conditions as well as you do, do you really recommend straining milk in the barn?" He frankly admitted that he did not, and thus by being approached in a different way squarely placed himself in accord with the principle which the board of health was trying to establish, and which he had criticised only a few moments before.

Again, some of the modern regulations may add to the cost of milk production, and the producer is not to be criticised for rebelling at what seems to be an increased burden arbitrarily forced upon him in a tactless way without a clear explanation of the reasons.

But if friction between health officers and milk producers is to be reduced to lowest terms, if there is to be an honest effort to get into closer accord, the producers have a duty in the matter as well as the health officers. The latter must be patient to explain, even to the point of tedious reiteration. But the producer must be in a receptive frame of mind. When those who have had a better opportunity for investigation than he has tell him about insecticides, chemical plant foods, and other things, he does not question the facts stated. The successful farmer has a receptive mind; is on the alert for new facts and when these are obtained is ready to receive and adopt them. Let us receive statements about milk in the same spirit. Let us remember that physicians are specialists in health matters and know more about them than we do. They know from many actual experiences the danger from contaminated milk. We must recognize their position as students of and leaders in health problems and receive their deductions as we do the statements of other investigators and specialists in the domain of agriculture.

Now then what are the facts—comparatively new facts—which warrant such increased attention to the nation's milk supply, and so many new rules regarding the production and distribution of milk. Speaking broadly this new phase of dairying rests on *bacteriology* which is a comparatively new science. It is a science which has thrown a flood of light into many hitherto dark places and has revolutionized a number of lines of work—notably surgery, to the saving of many human lives. As the work of the bacteriologist permeates dairying we can see why

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conditions that were tolerable a few years ago are condemned today, and that dirty milk may produce worse results than giving a bad flavor to butter.

What has this knowledge of bacteria shown us in regard to the milk supply of our towns and cities?

1st. It may now be regarded as an established fact that tuberculosis can be conveyed through milk from the bovine to the human race. All recent investigations point in that direction. The latest literature is unanimous on this subject. But even if I concede that the case is not proven, no one will dispute the assertion that the circumstantial evidence is so strong that we can afford to take no chances, especially where human life is at stake. Therefore whether we regard the tranmissibility of tuberculosis from bovines to humans as proven or not, the only logical and safe position is that we should adopt the best means available for keeping tuberculosis out of our herds. This means that all cows producing market milk should be tuberculin tested.

Such a test will not only make the milk supply more safe from the consumer's standpoint but it will have a direct personal benefit to the producer. (And this point has not been sufficiently explained to milk producers. In many respects their interests and those of the consumer are identical and a benefit to one results in benefit to the other.) On the advantage of the tuberculin test to the farmer I quote from the most recent authoritative utterance I find—a bulletin of the North Dakota Experiment Station of last July. "In dairy herds which harbor the disease it sooner or later will lead to a notable decrease in the production of milk; under its influence abortions often occur, while many cows ultimately succumb to it. * * * Tuberculosis either through death of animals or even by interfering with their reproductive functions constitutes a formidable enemy to animal husbandry. * * * In every herd, with the possible exception of range cattle, a tuberculin test should be made not less than once a year. * * * The annual tuberculin test advocated is based upon the same principles of economy as the purchase of an insurance policy, and it has the advantage of being comparatively inexpensive."

2d. It is now absolutely proven that typhoid and scarlet fever and some other ailments are due to specific germs, and that many

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epidemics of these diseases have been caused by the scattering of the germs through a community, in the milk supply. Consequently regulations as to the health of all who in any way handle the milk supply of a city or town are desirable. The necessity of sterilizing cans and bottles will also be self evident, as well as the importance of an uncontaminated water supply for washing all utensils, and keeping flies out of milk. Though in some cases these rules may seem to bear hard on the individual, the welfare of the community demands them, and the status of the milk business will be improved by increased popular confidence in it.

3d. It is now well known that excessive amounts of bacteria in milk, even of those that are not specific disease germs, may cause derangements in the digestive tract, especially of infants and invalids. It is proven that much of the mortality of babies is caused by undue quantities of bacteria in their milk. "Often the action of this milk with infants is not that of milk but of a poison," says Dr. Jordan, Boston milk inspector.

Some of this contamination is in the shape of pus cells in the milk of cows suffering from garget or other inflammatory disturbances. Hence the importance of selling milk from only healthy animals, and of rigid control of the health of cows furnishing city milk.

But the milk of healthy cows is practically sterile on leaving the udder, and subsequent contamination comes from the dust, or dirt, always floating in the air, even in the cleanest places, a few bacteria, from 1,000 to 6,000 per cubic centimeter, being generally unavoidable. Many of these are harmless in their proper place, but there are weeds in the world of bacteria as in the world of visible plant growth—you know a weed is merely a plant out of place. Then there are other forms of bacteria—but intimately associated with the so-called harmless ones—which are particularly active in causing intestinal and digestive disturbances. You cut your hand and bandage the wound because you say that if the air gets at it healing is delayed; really it is the bacteria in the air that do the damage. The cut may develop into an ugly sore because, in common language, dirt got into it; but really because bacteria got into it. These bacteria getting into milk may make it unwholesome or dangerous. Bacteria are intimately associated with dirt. Bacteria and dirt

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may be regarded as Siamese twins in any milk discussion. The cleaner the cow, the milker, the stable, and the milk room, the less bacteria-laden dirt, or dust in the air, and hence in the milk.

Some conditions are so excessively filthy as to be revolting to our æsthetic sensibilities—to say nothing of bacteria—and by unanimous consent are inexcusable. No one would defend the cow whose udder is plastered with manure, or milk with a black ring of sediment about the bottom of the bottle. But many good dairymen think that the essential thing is care in *straining* the milk which they believe to be all right if the cheese cloth or absorbent cotton removes all visible insoluble manure, hay, hair, and flies. The newer milk gospel preaches the doctrine of prevention; the keeping out of those things which seed milk with bacteria. Soluble and microscopic filth can not be strained out. Hence though white-washed stables, washing udders, clean milking suits, 4 square feet of glass per cow, immediate removal of milk from barns, fly screens in the milk rooms, may seem foolish fussiness—there are substantial reasons for such recommendations. Any means, no matter how trifling, for preventing the entrance of dirt into milk will tend to improve the sanitary quality of the product. Prof. Pearsons found that a single fly getting into milk carried 20,000 bacteria; a piece of hay about 2 inches long, 1,500,000; a single fine hair from a cow's flank, more than 25,000. Even the size of the opening of the milk pail is important. Prof. W. A. Stocking of Connecticut ascertained that in a stable where but little care was taken as to cleanliness an ordinary open milk pail admitted 3,439,200 bacteria, while a small top pail admitted only 103,600.

Some bacteria get into milk through uncleanliness of utensils. Rusty tin ware is made absolutely clean with difficulty. Milk with low bacteria is impossible if the farmer uses pails, strainers or cans with open seams as lurking places for dirt, which may be swarming with bacteria.

Bacteriology has given a new meaning or force to the word cleanliness. I visited a Missouri dairy recently and found some pails bright and spotless but my pen knife blade brought quantities of putrefaction from the seams in their sides. The good lady said that in addition to carefully washing the pails twice a day, she *brushed* out the seams *once a week*. She would have been

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much offended if I had bluntly told her that she was not cleansing those milk pails. She thought she was doihg well, but ideals of cleanliness have changed. Cleaner milk will tend to help producers by saving losses from souring, and by improving the market through the larger demand and better prices that will result from consumers' increased confidence.

In connection with the dangers from unclean or contaminated milk is a point not always fully explained to producers in clear, untechnical language. At meetings where clean milk is discussed it frequently happens that after the leading speaker has concluded, a gentleman in the audience will arise to take part in the discussion. His face is intelligent but lines of skepticism are evident—his bearing indicates that he is going to annihilate the lecturer. He tells the audience that he has used milk freely all his life and is alive and well to tell the story; that he has brought up a large family of children who have eaten milk in large quantities, and all are ideals of health; that he has retailed milk for many years and never knew of a case of sickness due to his product; in short, what the speaker has said may be all right from the theoretical or scientific standpoint, but if it were true from the practical side the human race would have perished long ago.

You have all heard this kind of talk—sometimes a sharp talker will use ridicule and sarcasm and bring down a hearty laugh on the lecturer. In reply: 1st. A proposition cannot be correct in theory but wrong in practice. Actual experience discloses the *sophistries* in many *plausible* theories. Practice and true theory must always agree. Nothing is more impractical than an unsound theory. I agree emphatically with the spirit of a recent remark of Dr. Twitchell "The day has gone by for any controversy between the scientist and the practical worker." (I would add that the scientist is a practical worker). 2d. There has been a sensational, scary way of treating the milk subject by yellow journals and speakers, which I condemn as much as any one. I recall a set of 3 pictures representing the same cottage with its tasteful surroundings of shrubs and trees. In the first a milk man's wagon stands in front of the house, in the second the physician's carriage, and in the third the undertaker's vehicle. That kind of argument (?) I deprecate emphatically. But as to the facts regarding bacteria and health:

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Health is man's normal condition, and nature does much to keep him in health. She gives him power of resistance to help withstand the attacks of disease germs and other bacteria. But these resistant powers are very uncertain and unreliable. They differ with different people and with different periods of life. They are not the same at all times in the same individual. As a rule they tend to decrease as we live an unnatural or artificial life. All the mysteries of life and death it is not given us to know, but we do know that one person may violate almost every physical law and live to a good old age—while another under apparently favorable conditions succumbs to typhoid or tuberculosis. Not every unvaccinated person exposed to small pox contracts the disease. Many survive an epidemic of cholera. Not everybody who drinks unclean milk goes to an untimely grave. But it is wise to avoid as many *chances* as possible. Because every cry of mad dog is not followed by a case of hydrophobia shall we lessen our efforts to eradicate rabies? If only one baby in a hundred contracts tuberculosis through the milk supply if that baby was yours or mine would we not favor the compulsory use of tuberculin? Shall we allow sanitary science to keep company with the lost arts because a majority of people are tough enough—have sufficient resistant power to live amid bad surroundings? Shall we feed the babies of our cities with poisonous milk because it does not act with the quickness and impartiality of styrchnine, and injures *comparatively* few?

A complete discussion of the milk question would consider the dangers which milk receives in transit and in the consumer's home. Some work undertaken by the Boston authorities showed that of a lot of samples tested—not the same milk—98.5% were within the limit of 500,000 bacteria per cubic centimeter at the place of production, 87.6% were all right on arrival at the city, only 54.4% would pass muster on the peddlers' wagon, and only 28.5 per cent were satisfactory in the grocery stores. A worse showing could be made of the milk in many family refrigerators. But this is not the place and the time is insufficient to discuss those phases of the question.

I will pass from the "Why" of my subject to the "How." That may be in a degree inferred from what I have said. If clean milk is desirable because dirty milk is unwholesome, then

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we want to come as near as possible to clean cows, clean milkers, clean barns, clean milk rooms and clean utensils, remembering that cleanliness has a new significance nowadays. Even then milk should be exposed to the air as little as possible. Furthermore we must bear in mind that most of these bacteria increase very rapidly at the natural temperature of milk, or even 20° or 25° below; hence milk should be cooled as promptly as possible and kept at 50° or below until used.

In order to secure the conditions which are needed to keep the bacteria down to the lowest possible number, official inspections and regulations are imperative; we cannot rely on the good intentions of the producers when they are numbered by the hundreds or thousands, for many will be found who are ignorant or negligent. One of the most unsanitary milk rooms I ever saw had a pile of calf manure under the window where a pail and can were airing—and the proprietor of the place worked 3 years at the Vanderbilt dairy at Biltmore and knew thoroughly what proper conditions are.

But these regulations should be such as to produce the best results with the minimum of trouble to those who wish to do right.

Not a little of the friction between milk producers and health officers results from the bearing of the inspectors, who, possibly political appointees, may have no practical knowledge of their business. (A State of Washington law requires dairy inspectors to be dairy school graduates.) It is not to be wondered at that the average milk producer resents criticisms from some who inspect his premises, and hastily jumps to the conclusion that the whole inspection business is a passing fad with no substantial basis, merely imposing additional burdens upon the already overworked milk producer.

Considerable experience has convinced me that this form of friction can be reduced to a minimum by the score card system of inspection, whether used by the butter maker in securing a better quality of product for his creamery, the market milk buyer, or the city or State officer. A certain number of points are assigned to about 60 different subjects, and the inspector expresses his judgment on each one in turn by giving it a rating. He secures the most helpful and friendly results by talking

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with the farmer as he scores. Six points are allowed for cleanliness of the barn;—the inspector can call attention to dirty windows, to cobwebs on the ceiling, to manure spattered on the walls, to dirty floors. The farmer sees all these—no controversy can arise over their existence. Perhaps the inspector says to the farmer, "Now, Sir, calling 6 perfect how many points do you think it would be fair to allow you for cleanliness of stable?" Eight times out of ten, the farmer himself will place a correct estimate on his own conditions. Similarly with other topics on the card. When the whole card is filled out the figures are added in the presence of the farmer. There is no mystery about it and nothing arbitrary. The final rating is incontestable and at the same time so manifestly fair that no criticism can be made. But should he feel that injustice has been done him it can be easily proved or disproved by a comparison of his premises with the permanent record on the score card. I have made hundreds of inspections in a score of States. In only two instances have I met with any but the kindest treatment. One was a dairy to which a bad outbreak of typhoid fever had been traced and the place had been renovated under direction of the local health officer; though the place was scored much above the average—73—the proprietor was disappointed that it was not found to be perfect. The other critic was a chronic kicker who always found fault with everything. Very often my work is received with thanks and a pleasant invitation to call again. Another advantage of the score card is the great simplicity of regulations resulting from its use. Instead of burdening the farmer with remembering a lot of rules, instead of irritating him with a multiplicity of "Thou shalt nots," we can have this simple rule that any dairy scoring below a certain point—say for instance 50—will be regarded as unsanitary and its product will be rejected by the creamery, the market milk buyer, or the city health officer. The score card instead of drawing an unexplained, mysterious dead line constantly holds out a temptation to progress. A Tennessee inspector told me recently of a producer saying to him, "My score is 60, but it will be 65 the next time you visit me—for I see where without much great trouble I can gain 5 points." This idea of advancement is stimulated in some places by publishing the names and scores of the best dairies.

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From the official side the score card is valuable because it furnishes a good record of the work of the inspector. It requires a written statement of his judgment in such a way as tends to thoroughness, fairness and impartiality; and the file of these cards has no superior as an office history of the work of the Inspection Department.

SOME THINGS DAIRYMEN HAVE TO CONTEND WITH.

By Dr. C. D. Smead, Logan, N. Y.

Year after year we meet in many states in convention, to discuss the cow and her products. This has been going on for many years, and bids fair to continue for many years to come, the end not as yet being in sight. Why is it thus? may be asked. The answer is by no means difficult. We simply have not yet learned all that we need to learn concerning the cow and her ways. She is truly a mysterious beast; were it not so, we long since would have learned all about her and how to best utilize her products. Some have thought they knew all that was to be known about her; yet as she has been the more closely studied by those who were really cow students, the more they have discovered to be learned concerning her. This can partially be accounted for by the fact that she has by man's skill been an ever changing creature. The dairy cow of today is but the mere semblance of her remote ancestry. In some cases we find her being starved until she is not what she was bred to be; at other times we find her being so fed from calfhood up into heiferhood as to make her pretty to look at, and that is about all that can be said in her favor; much like the petted boy or girl of good parentage, the boy growing up a dude and the girl pretty to look at when adorned in tailor-made garments, a diamond brooch at her throat, a bracelet on her arm, a rose in her hair and a giggle in her mouth. The heifer counts for about the same in the dairy as the said boy and girl in the family. All three are rather expensive. We support them for the privilege of their company and not for their usefulness. Boy, girl and heifer were all bred for a higher purpose in life, but they were

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spoiled in the bringing up. This in brief is the history of many a well-bred cow. Another word picture I will draw. A calf may be well born and well fed and not over-fed nor under-fed from birth up into calfhood or into heiferhood and prove a disappointment. Right here we find a great variance of opinion existing among progressive dairymen. Some say the heifer should not be bred to become a mother until she is three years of age; others say three and one-half years, and others are firm in their belief that thirty months is the proper age, and some say two years; all these men are honest in their belief, but all of them sometimes fail to realize their hopes. The heifer sometimes, is like the girl who thought to get married, but changed her mind and concluded she would not. Then it is the owner of said heifer seeks veterinary advice. He feels worried over his beautiful heifer not getting in line to produce him something to repay him for the care he has bestowed upon her. Now I am going to put a chip on my shoulder and throw down the gauntlet; take my chances and say I don't think any cow owner is capable of dictating as to when the 20th century heifer should become a mother; I mean the exact age. Just in proportion to the inherent tendencies she possesses and those of her ancestry, togther with the food and care she has received will her age of puberty come. When that becomes a fixed part of her physical being, then is the proper time to start her on the road to maternity. Strive to balk her in this and dictate as against the laws which govern her individual nature, and we run a great risk (providing she was bred to produce well at the pail) of so changing her organs of reproduction that we soon have a barren heifer on our hands instead of a producing cow. This, gentlemen, is no fancied theory of my own based on a few experiments. My assertions can be backed up, not by limited observation, but by a wide experience as a veterinarian among herds of the best cows in the land, as well as among some of the poorest; among good farmers and poor farmers, good dairymen and poor dairymen. And I stand here ready to say: Bred as our dairy cattle have been, they stand before us as very unbalanced and abnormal beasts. Bred as they are to produce milk in a large quantity, rich in solids, we must breed them at a younger age than many are breeding them or barrenness is destined to

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increase instead of decrease. We are not, as a rule, taking into consideration the heifer as she is; by which I mean the abnormal make-up of her physical being which we have bred her into and fed her into. We have looked for the large mammary gland and milk veins and failed to consider that the reproductive organs were in close correlation with them. As we have bred and fed for the excessively large milk function, we have to an extent weakened or dwarfed the organs that are so closely related to the said glands. We must not lose sight of these facts or we cannot escape barrenness and abortion in our herds. It is a mistaken idea that many entertain when they think that early breeding necessarily weakens constitutional vigor or seriously dwarfs the size. While it is true under a restricted or insufficient or improper diet, whenever a proper and generous system of feeding has been practiced, there is no evidence to sustain that belief, neither do we find animals seriously dwarfed in size when the age for maturity arrives. In our dairy operations we have made rapid advancement in some things and stood practically where our fathers stood in other things. As was stated in the beginning, we have many of us failed to see that there are two sets of organism in every female, the reproductive and the one which furnishes the nourishment for the product of the first named. Our aim has been to develop the organ which secrets the nourishment (mammary gland) and we have not given proper attention to the organ which furnishes the being for the mammary gland to nourish. We are overlooking the fact that all organs in their regular order need developing. As a child grows, its limbs require action or they remain dormant; allow the child to move its arms and not its lower limbs, and it never would be strong enough to walk. The same logic holds equally true and can be just as sensibly applied to the reproductive organs in our animals. When nature calls for their being brought into action and this call goes for a year or even in our highly bred dairy animals for a few months unheeded, nature ceases to call, or if she does, it is a feeble call from a dwarfed organ which has not developed as nature designed it to do. To insure a mother and a long period of motherhood, we cannot ignore the first calls of nature beyond a very limited period, or we must expect barrenness in our best heifers, and sterility in our cows as soon as

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they come to their full maturity. It is not the cow that became a mother at a tender age when well fed that becomes sterile at five years of age nearly as frequently as it is the cow who first became a mother at three or three and a half years of age. Wherever I have found a lack of vitality and a seriously dwarfed condition in the early bred heifer, I have always found said heifer or cow had not been fed as her physical needs required. It was lack of an invigorating, nerve and force building food which caused the debilitated condition and not the early motherhood. A careful study of dairy cows will show to those who study conditions unbiasedly that it is the late bred heifer which will more likely prove promising for one or two years and then disappoint us in her milk yield, no matter how well we may feed her on a milk producing ration. And that brings us to another question in the feed and care of the 20th century dairy cow. Our line of study of cattle foods is largely from one point of view, and that is to ascertain what food or combination of foods will send the greater yield of milk into the pail, and not attention enough is being paid to the study of foods which will sustain our milking machine, the cow. Our working machine must be so fed as to not only produce milk, but also nourish, sustain and give birth to another machine. When we study cow feeds from any other basis than this we are getting off of the proper line which leads to the goal of success. I sometimes feel like saying to a goodly number of New York scientists and dairymen, "You are in serious danger of having an attack of milk fever." In fact I know of a few who I really believe have got a milk fever or such a mania over milk and large yields of it that their cow reason has nearly left them. They can talk cow only as they speak of her ability to eat a certain class of food and convert it into milk. It is milk and more milk and better milk, and they are only satisfied with a food that will cause the old cow to produce a little more milk. But rarely is a word heard concerning a food that will keep the cow machine in repair, that it may last as a producer of milk at a profit into old age, which simply means that our best bred heifers may be lasting cows and yearly breeders. It is easy to see that under our present system of feeding our best bred cows and heifers are failing to breed for us as they should.

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This all cannot help admitting. We can only attribute this condition to the fact that first, the reproductive organs in our heifers are not started right and then the heifers are not fed right. Nature's laws have been interfered with in some way; their breeding and milking don't go together. The machine is out of whack. It would not have been thus had all parts of the cow machine been started as nature designed and then a class of food and care given which would not allow one part of the machine to take all the energy from the other. The belt that runs the calf factory has been allowed to get rotten from lack of attention, not because it has worn out by early being put in use. We are running one part of our machine at a rapid speed and keeping it well oiled, while we do not oil the journals of the calf machine at all. The dairies of today are not the dairies of twenty or even ten years ago. Our father's cow was thought to be a hummer when she produced 5,000 pounds of 3 or 3½ per cent milk. The general run of dairy cows did not produce 3,000 pounds of milk. The rule is now 5,000 pounds of 5 per cent milk. We are daily hearing of 7,000 pounds of 4 per cent milk or 10,000 pounds of 3 per cent milk. These yields are common and no doubt can be maintained and even increased, but if the cow is to produce this amount and at the same time yearly give birth to a living vigorous calf for a period of years, we must start the calf machine at work when nature calls for it, of that I am fully convinced. Then we must feed the whole organism, not a part of it as some are doing, and as the general tendency of cattle feeding in the east is drifting toward, I am sorry to say. I refer to the milk producing functions. I realize it is hard for us all to get out of old ruts and the notions that were taught us in the days of our childhood and youth. Father's cow under father's care and management did fairly well for him; she usually dropped a calf yearly and produced about what milk the calf needed with a little to spare for family use for about eight months. This was about her limit, but we want our cow under our system of breeding and feeding to produce milk enough for two calves for four months, and then to keep fairly well two more calves for four months; then to feed a calf for two months more. This wonderful power that our more modern cow possesses has to an extent made a corre-

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sponding weakness in her maternal functions, which of necessity must always be considered and in early life put in operation or they will fail when they are required for action. As we study nature's laws, which govern conditions, we learn how to control forces that were unknown to us a few years ago. We see this manifested in many things, our modern dairy cow not excepted. Early breeding does not, all things being equal, weaken vital forces, as is quite commonly believed. In fact, the effect is quite the opposite. All that early breeding does is to make a demand for more food, as two lives will be jeopardized, if it is not furnished. While germs no doubt cause many abortions, they by no means cause the greater per cent of them. In fact, true germ abortion is far less than that which is purely the result of weakness and sympathy, which the feeding of oats and wheat bran more plentifully to the calf, heifer and cow later on, will largely obviate. We are feeding by far too much of the very concentrated by-product protein foods for the purpose of increasing the milk flow. It is more oats and peas and wheat bran and a little less cottonseed, malt sprouts and dried brewers' grains that are needed on many farms; we may get a little less milk, but we will have more calves and better calves to show for it. The time will come in the near future when it will not be preached from the platform and in bulletins, that a pound of protein in one food is worth just as much as in another. It may work out well in laboratory work, but it won't always do so in a cow's stomach. Dan Patch does not go his mile in 1.56 m. propelled by the energy found in wheat bran and corn meal, neither does International Stock Food put his nose under the wire in that time; all it does is to furnish the seasoning for the oats he eats which do the work. It is the nerve principal found in the oat which furnishes him the power to get there. The chemist can so mix the wheat bran and corn meal that just as much protein, carbohydrates and fat will be in this ration as in the oats; but Dan, if thus fed, would fail to get to the distance pole in 1.55, before the flag would drop in his face. Now, my brother dairymen, it is some of this kind of logic that we need to carry into our calf-raising and cow feeding. Then breed the heifer when she desires to breed. Some of our old time notions need burying and after we bury them and get on a different line

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of feeding and breeding we will not hear half as much complaint regarding sterility and abortion in our herds as we hear now. Thus far I have treated my subject more on the line of what has been considered to be good feeding, or in brief feeding for more milk. My argument would be incomplete should I stop here. We have dairymen who feed wisely and well part of the time and fail to feed well the remainder. The love of milk is so great on some dairy farms in New York and perhaps in the State of Maine, that the little calf is largely deprived of it at a very tender age; sometimes several days or several weeks before its digestion calls for solid food at all. Hay tea, doctored skim-milk or some patent calf food is fed. There can be no doubt but some calves will exist and grow fairly well on this class of food, but the mass of them will become dyspeptic by reason of the lack of nature's food. Good, new milk, until such a time as the little thing's stomach will call for a bite of clover hay or a handful of ground oats, is what it needs. It is step by step humanity is reared from babyhood up into manhood and womanhood, and there are pitfalls all along the way. A misstep and into the pit the child goes, to come out a cripple or an invalid. All physicians are enabled to agree upon some things, and one of them is that the future destiny of a child is many times fixed during the first two years of its life. As a mouthpiece for the veterinary profession, I will say the first year of a calf's life generally fixes its destiny, and many times the first month of its existence decides its future value in the dairy. When we wander out very far in our calf feeding from what nature provides for it, we are getting on the danger line and treading on slippery places. The desire for milk or the money value it commands frequently leads many to starve the calf to the extent that it grows up much weaker than it was born to be. A cow with a poor digestion is a poor stick in the dairy. There has nothing yet been discovered and there probably never will be, that will take the place of the mother's milk (when it is a balanced milk) in calf raising, early in its life, and good, whole new milk for the first month of its life. In a case where the milk is extremely rich in butter fat, a few hours setting and the removal of a little cream may better balance it for feeding the calf. Some jersey and Guernsey milk are too rich in solids

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for best results in calf feeding. In fact, milk testing 5 per cent butter fat is an abnormal milk and some warm water added may be an advantage, but to put said milk through a modern separator and feed the milk warm thinking it is an all sufficient calf food, is simply nonsense. The stomach of an ox might digest it, but the stomach of a calf will not as a rule; its digestion soon weakens under the strain. Feed new milk and warm milk and never allow the young calf to become exceedingly hungry. Feed little and feed often until it is fully two weeks of age, and many a case of scours will be averted. Then if the calf is weakly, continue the new milk two weeks longer before any warm skim-milk is mixed with the whole milk and the digestion of many a calf will be saved that otherwise would be lost. A choking down of many a dairyman's desire for milk is needed. Another thought and I will close. Many a dairyman weakens his cows and renders them fit subjects for disease by what I call "push and pull feeding." By this I mean he feeds well when the cow is milking and then feeds any old thing when she is dry. It is the cow that is fed well all the time that stands up under the strain of producing both milk and a living healthy calf yearly into old age. It is the half fed, half nourished cow that goes to an early grave from disease, simply because she has not the power to resist disease germs. It is this kind of a cow and the fairly well fed idle cow in a foul aired building where we find tuberculous baccilla getting in their best work. Strike a happy medium, Brother Dairyman of the State of Maine. Furnish good food all the time from calfhood up; furnish sunshine and pure air with exercise in the open air when the weather will permit and you will have better herds, and stronger herds, less disease and less calls for the veterinary. Keep the calf growing from its birth every day. When it reaches the age when puberty is established, you need not fear to breed that calf regardless of its age, but don't forget to feed it right along. I do not mean by this that a heifer that it is desirable to grow up into a dairy cow shall be kept in a condition fit for the slaughter house from the time it is weaned up into motherhood; but I do mean to say that at no time should it be kept in a condition whereby its vitality becomes weakened. There are scores of instances after heifers are bred where they are turned into

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some back woods pasture, where there is insufficient pasturage, and while they manage to exist and even grow some, they frequently do not get vitalizing food enough to grow them, and at the same time develop a foetus and the result is they abort from weakness of the reproductive organs; or if they carry their calves full time and give birth to them, there is either an udder with no milk or the heifer's vitality is injured, her growth stunted and she becomes a weakling ever after, not from early breeding but from the lack of nourishment sufficient for her own growth, the growth of an offspring and of an udder to furnish nourishment for that offspring after it is born. It is a study of the whole animal and not a study of one part of it which is the universal need of the dairyman from one ocean to the other, and a study of feeds that will make for us a stronger machine to call upon for work. When this is more extensively done, there will be far less abortion than now, far less call for state enactments to send out veterinaries armed with a bottle of tuberculin, a hypodermic syringe and a thermometer than there is today. Study healthy growth of your dairies; study the laws which maintain health and let disease problems be solved by the veterinary. When you get proficient in your line of study, the veterinary will not have much to do.

Ques. I have two heifers that came in this fall and both calves died with the scours within 36 hours. Can you tell me the cause and remedy?

Ans. I would have to know about the heifers individually. These heifers might not have had nourishing food enough to support two lives, to maintain their own growth and at the same time develop their offsprings. It may be from lack of nourishing food. I fully agree with everything that Prof. Woods has said, I fully agree with all that the scientists are doing; but I tell you we cannot find in any combination of concentrated foods what we can get in the foods that we raise on our own farms. I am crank enough to say that in every ration of cottonseed meal we need a few oats. If oats are worth $40 a ton to feed to horses, that cow on your farm that is expected to give birth to a calf should have a quart of oats. As far as protein is concerned it is an expensive food, but there is a little element contained in it which the chemist knew nothing about five years

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ago, yet it has as much potency as strychnine has today. If you were suffering from a nervous disease the physician would give you some of that principle found in the oat. Wheat bran is certainly too expensive to buy at $30 for the protein, but it is not too expensive to buy to get some of the ash or the bone that is necessary to grow the calf. There is no combination of the concentrated foods that can be made that is equal to oats or wheat bran for this purpose.

Ques. Would you grind the oats?

Ans. Not necessarily for the calf. For the cow I should.

When our fathers used to feed the home grown foods, the oats, peas and wheat bran from the mill, we did not hear anything about a lot of troubles that we have today. Here in Maine with the clover and oats and peas that you can raise upon your own farms you need not buy half the cottonseed meal you are buying today. With these protein foods and the corn and succulent food which you can raise, it is not necessary to buy as it is in New York. We are too much in the habit of buying these foods because we can see a little more milk in the milk pail. Sometimes for the love of milk we are weakening the animal. Of course oats and wheat bran are too expensive to feed largely but in growing your calves you need some of them. I am sort of a go-between. Here is the farmer on one side and the scientist on the other side. The scientific principles are all right, but when the farmer applies them he frequently makes mistakes and I have to step in between and cure the cow. I would feed some cottonseed meal if I had some succulent food to feed with it, but let that be the small purchase and raise all you can. I do not think I would make the distinction that has been made, however, between the linseed and the cottonseed. The cottonseed is the cheapest source of protein, but it can be fed to only one animal that we have on the farm, and that is the cow. It is not as palatable or digestible as the linseed and it is a question whether these points do not more than counterbalance what is gained in the protein. Put them price for price today and on my farm give me linseed.

Ques. Do you think it will pay to raise calves? I have been told that a calf at six weeks old will bring more than at one year old.

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Ans. Well, where are you going to buy your good dairy cow? Is there any spot in the United States where men are raising first-class dairy cows? The man who makes a practice of buying his dairy cows has to take what some one else casts off, except that there will sometimes be a closing out sale when he will be able to select the best. It is a hard matter to start out today and buy ten cows or twenty cows that are profitable cows. More cows must be raised, and raised on the farm. There must be more horses raised, right here in the East. There is not a section in the whole United States, and I have been pretty well over it, that is capable of raising as good cattle and horses as right here in the State of Maine, with your clover and natural grasses, and your low priced land. Right here in Maine horses are doing the work on farms that would not sell for $20 an acre that were raised on farms in Iowa worth $80 an acre. If you have good cows, and good calves, raise the calves and you will be something ahead. When you buy a calf you are getting an unknown problem.

In regard to feed, I think a good deal of refuse apples,—small apples after they become soft and ripe. I am no authority on feeds, but I raise a few apples and have a small dairy and this season I have fed quite a few apples ever since August, and my cows have done unusually well. Apples are nourishing and appetizing. They ensure better digestion of the other class of more nitrogenous foods which the cows are eating.

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"THE NITROGEN PROBLEM AND THE DAIRY."

By Professor WILLIAM D. HURD, Dean of the College of Agriculture, University of Maine.

Nitrogen is the great stimulating element essential to plant and animal life. It is as necessary to your life and mine, and to the plants and animals about us as the water we drink or the oxygen we breathe. It, with other things, forms protein—the flesh forming feed and the material required for building up the tissues of the body, and for maintaining these under the wear caused by the vital functions.

In the past hundred years its existence, the various forms in which it is found and the part it plays in the organic life of the world, have furnished a problem ever presenting something new to scientists. The end of this study is not yet, although the past twenty years have given perhaps more definite knowledge of this subject than all the years that have gone before. With potash, phosphoric acid and lime, it ranks among the elements of foremost importance in Agriculture. Compared with the other three it is the most elusive, appears in more varied forms, is most easily lost and at the same time is the most abundant of these four important elements of plant and animal life. Upon the proper handling, conserving and maintaining of this element, nitrogen, depends the future fertility of the soil and the ability of the land to produce food and raiment, and to supply all the needs—yes, even the luxuries of civilized nations.

The last fifty years have witnessed the greatest progress in the advancement of agricultural science. Liebig, Boussingault, Lawes and Gilbert, and others, through their application of well known laws of chemistry and physics to this science have brought agriculture to a stage where it ranks first among the arts, and is second to none of the professions. These men and those now working in laboratories all over this and other countries have turned men's thoughts to the soil and its possibilities, and have indeed opened up a "New Earth" to inquiring minds. We have been taught new systems of husbandry; new methods, and new ideas have been given us. Among these the part nitrogen plays is not the least. In this new agriculture we have been turning our attention to the proper forms of human food to use, the proper form of fertilizers to buy in an effort to increase our crop production, and the balanced ration as applied

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to the feeding of our domestic animals. The first two of these are not to be discussed in this paper, but the latter—the part nitrogen plays in the activities of the dairy farmer—is the subject to which I especially desire to call your attention at this time.

The hold that the consideration of the nitrogen problem has taken on the world at large caused a prominent writer to say, a short time ago, that we are "Nitrogen mad." Whether this statement be true is perhaps an open question, but nevertheless it is of paramount importance at the present time. I have heard it said within a few weeks that dairy farming was "getting a black eye" in Maine. I do not believe this statement for I am sure statistics show that while the number of cows have decreased during the last few years, yet the annual production of a lesser number is greater than it was before. This is a hopeful sign. It shows that men are putting thought and business judgment into their work—are discriminating between the cows that do not "pay their board" and others that are profitable. If the dairy business in this state is not yielding the returns it should today, I am ready to say that one at least of the principal causes, is the fact that farmers are attempting to run their dairies by purchasing feed in large quantities, instead of tilling the land and making use of the plant food nature has placed at their disposal. I have made this contention before this Association in years past, and further years of associating with you, and studying the conditions more carefully, only serves to make this belief stronger.

You are buying hundreds of pounds of feeds rich in protein,—a term used by chemists to cover all albuminous materials, nitrogen included (6¼ parts of the protein is nitrogen)—and large amounts of nitrogen in commercial fertilizers and at the same time you are allowing hundreds of pounds of the material to be lost each year and are not taking advantage of the inexhaustible supply of this most costly element, nitrogen, which comprises about 75% of the atmosphere. Nitrogen is costing, when bought in the market, 18c. per pound, phosphoric acid only about 5c, potash about 4½c, and lime about 4-10 of a cent per pound. Nitrogen is the most easily lost of these elements and should receive most careful consideration.

Dairy farming comes nearest being the safest kind of husbandry, because in live stock production, we should aim to raise

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a large amount of feed, and use this through our animals for the production of finished products, returning a large amount of fertility back to the land in the shape of manure. There are those who will tell you that the absence of live stock is one of the fundamental causes which has led up to the "run-down" condition of much land in New England.

The Minnesota Experiment Station has worked out the losses in fertilizing elements in different systems of farming. On a farm of 160 acres, there might be sold in a year, when different systems are practiced, the following amounts of nitrogen, potash and phosphoric acid:—

System of Farming	Nitrogen—lbs.	Potash—lbs.	Phosphoric acid—lbs.
All grain	5600	4020	2460
Mixed grain and general	2594	1047	1003
Potato and general	2363	2435	991
Stock raising	898	59	35
Dairy farming	809	85	76

These figures show clearly that dairy and stock farming carry less away from the farm than the other systems. If in the case of dairy farming only butter is sold and the skim-milk is kept on the farm and fed to young stock, there is only a very small amount of fertility lost, and this is made up many times in the feeds that are usually purchased, and the manure that is returned to the land.

While it is well that we understand these facts, it is not enough that we should be satisfied with a fair condition of things, but when we know certain losses are occurring we should strive to correct them. There are three important things which have a direct bearing on this nitrogen problem and the dairy to which I wish to call your attention today.

1. The waste and losses of nitrogen due to the careless management of stable manure from the dairy herd.

2. The character, quality and amounts of feeds rich in protein which are purchased.

3. The sources of nitrogen on the farm, and the uses the Maine dairyman should make of them.

1. The losses of nitrogen from stable manure.

Nothing perhaps impresses itself on one as he travels over this and other states so much as the fact that there are very

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great losses from the manure heap occurring on every farm. It is of course impossible to prevent all loss from this source but either farmers do not realize or else they are careless in this direction. I know of men in this state who allow the drainage from stable manure to run down the barnyard, across the road, and I have even seen the rich dark colored liquid finding its way into the waters of the Penobscot, the Kennebec and the Androscoggin rivers. Inquiry on my part has brought out the fact that these same people were attempting to replace this nitrogen costing 18c. per pound, potash costing 4½c. and phosphoric acid costing 5c. the following spring, by purchasing commercial fertilizer. It is needless to comment further on this point as a business proposition.

Losses from stable manure occur chiefly in three ways:

1. Loss of the liquid portions through the stable floors.
2. By heating or fermentation.
3. By allowing rains or melting snows to leach and carry the fertilizing elements away after the manure has been removed from the stable. It will be apparent that anything done to lessen loss in either of these directions, is so much saved in dollars and cents.

ESTIMATE OF THE VALUE OF THE MANURE PRODUCED BY TWENTY COWS, FED ON THE RATION GIVEN BELOW FOR 6 MONTHS.

Kind of Feed—Daily Ration	Nitrogen—lbs.	Potash—lbs.	Phosphoric Acide—lb.
30 lbs. Corn silage	0.108	0.099	0.042
12 lbs. Clover hay	0.240	0.264	0.052
1 lb. Cottonseed meal	0.065	0.018	0.027
3 lbs. Bran	0.066	0.048	0.084
1 lb. Linseed meal	0.054	0.011	0.014
1 lb. Corn meal	0.020	0.004	0.007
	0.573	0.444	0.226
Add 5 lbs. straw each day (bedding)	0.014	0.044	0.005
Amt. of fertilising elements per day in feed	0.587	0.488	0.231
About 75% of fertilizing elements in feed are left in manure	75%	75%	75%
	0.440	0.366	0.173
Multiply by 20 cows	20	20	20
Pounds produced by 20 cows in one day	8.80	7.32	3.460
Multiply by 180 days	180	180	180
	1584.0	1317.6	622.8

1584 lbs. Nitrogen at 18c. per lb	$285.12
1317.6 lbs. Potash at 4½c. per lb	59.29
622.8 lbs. Phosphoric acid at 5c. per lb	31.14
Value of manure of above 20 cows for 6 mos	$375.55

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Too much emphasis cannot be laid on saving the liquid portion of the excrement. This liquid portion contains about 80 per cent of all the nitrogen and about 66 2-3 per cent of all the potash contained in the manure. Further than this, these elements are already in a soluble form and are the more readily lost. If this escapes through leaky stable floors, or by improper storing, very little is left beside the strawy matter and some phosphoric acid. It then is clear that a tight stable floor is the first requisite to prevent this waste, and secondly some absorbent, it matters not what, should be kept on this floor to at once take up the liquid portion before it is lost. Straw is of course best, since it aids materially in improving the physical condition when applied to the land, and at the same time has some fertilizing value, but in the absence of straw use leaves, sawdust or shavings rather than lose the most valuable portion of the excrement. While sawdust probably has no actual benefit on the land, it at the same time, in the quantities generally used, does no particular harm, and should be used every time in preference to nothing as an absorbent.

A few years ago the matter of chemical absorbents was freely discussed. We are not hearing so much about them at the present time, but experiments have shown that gypsum (land plaster),—never ordinary lime—kainit, or other potash fertilizers, and acid phosphate, all help keep the stable sweet, and when sprinkled in the tie-up each day, or over the manure pile, help prevent fermentation and of course add that much to the value of the manure, provided it is properly cared for in the pile.

The manure cellar, so commonly used in this state, has served its purpose well so far as preserving the manure is concerned but now since the question of sanitary milk and bacteria are receiving so much attention it is doubtful whether this is the best means of keeping the manure or not. The manure cellar is expensive to build and try as hard as we will there are odors always finding their way into the stable. The cheapest and most approved plan now is to have a cheap shed attached, or detached, to the tie-up into which the manure is wheeled or carted and stored. The more flat and compact the pile is kept the less fermentation there will be. When the odor of ammonia is noticeable you may know that there is considerable nitrogen

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worth 18c. a pound passing off into space. In constructing the bottom of the shed, scoop it out so that it is slightly concave and be sure that no drainage from the pile runs off down the hillside. It often becomes necessary to remove a part of the manure from the cellar or shed during the winter to make room for more that is being produced. In making the compost heap in the field observe the same precaution. Do not build the pile on a hillside but rather where the ground slopes toward the center, and make the pile compact and keep it flat on the top.

The best method of applying in the field is a matter which usually causes considerable discussion. The three common ways are to draw daily from the stable and spread on the land, to pile in small heaps, and let these remain for some length of time, and to draw spring and fall from the pile and apply to land plowed or to be plowed in the future. On account of the amount of snow we have in this state the first is impossible although it is the most desirable of the three. In my judgment the second should never be practiced. The small pile of two or three bushels offers the best opportunity imaginable for leaching, heating and fermentation, so should be avoided. We have then the third way left as the only alternative. Whenever possible I would advise getting the manure into the soil either by plowing or harrowing as soon as possible. The soil has certain powers of fixing nitrogen to a slight degree, and potash and phosphoric acid to a greater extent, hence loss is prevented. The practice of allowing a covering of valuable stable manure to remain on sod land especially during variations in temperature and when the ground beneath is frozen, is a questionable practice, and should be avoided whenever possible. Besides the loss of plant food the strawy matter valuable later to form humus is often blown away and lost. Whenever it can be afforded I would recommend the use of the manure spreader. It is a great time saver to say nothing of its ability to spread the manure more evenly and break it up finer. An experiment tried last week on the college farm showed that a man and team could haul out and spread 1-3 more manure with a manure spreader than with a cart in a day's time.

The figures that I have given you show something of the value of the stable manure commonly produced, but often ignored on many farms of the state.

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Time does not allow a more detailed discussion of this phase of the matter, although I assure you there are many other important things which might be discussed in this connection.

The second part of my subject, the purchase of feeds rich in protein and their relation to the dairy, has been so fully presented in another paper at this meeting that I will leave this and pass to the third question to be considered,—the sources of nitrogen on the farm, and the uses the Maine dairymen should make of them.

I have already considered one source, the nitrogen found in stable manure. The other source is that which can be produced by the growing of certain crops, among these being those belonging to the botanical family Leguminosæ, the most common of which are the clovers, peas, beans, vetches, soy beans, cow peas and alfalfa.

We are not favored by climatic conditions as they are in the South so that the most of these cannot be grown here. Cow peas and soy beans are out of the question, alfalfa is as yet in the experimental stage, and so far as I know, no one in this state has been able to grow a field and have it get larger and stronger each year for five, seven or ten years. Throwing all doubtful crops out of consideration there are two, clover and peas, belonging to this family, which thrive better and are easier to grow in Maine than in any other state with which I am familiar.

It seems to me that this side of the question—the growing of crops on the farm—is the most important phase of the whole matter. The growing of clover or peas, besides furnishing feed rich in protein for the dairy herd, has a direct relation, through the tillage required, and the fertilizing value left in the soil, to the fertility of the soil, future land values, the effect on coming generations, and agricultural prosperity.

The failures that have been recorded in attempts to grow clover are due largely to a poor understanding of what the conditions for its growth should be and attempts have been made to produce it under conditions entirely unsuited to its growth. The past twenty years have taught us that closely related to the growth of clover and its power to improve the soil is the life of numberless forms of microscopic organisms in the soil. We have passed through that wave of excitement

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when we were told that soil inoculation was the one salvation for "run-down" lands. We are now ready to say that given the proper conditions so that the clover plant can thrive, the bacteria will increase in a like proportion. In answer to the statement so often heard, that one cannot produce feed as cheaply as it can be purchased, I submit the following statement of expenses of growing an acre of clover through three years under our existing conditions at Orono in the way we have been doing for the past few years. I realize that the cost of operations under different conditions varies and so I have tried to make this up for an average season, and I think I have estimated the different operations liberally.

ESTIMATED COST AND PROFIT OF GROWING AN ACRE OF CLOVER, COVERING A PERIOD OF THREE YEARS.

Amount Expended.

Plowing and fitting land	$4 00
Cost of clover and grass seed, and labor of seeding	3 25
Seeding down fertilizer, 350 lbs.	5 60
Harvesting and threshing oats	4 25
Cost of chemical top dressing, 2nd spring	5 95
Cost of cutting and handling 3 tons hay @ $2.00	6 00
Cost of chemical top dressing for second crop	5 95
Cost of cutting and handling 2 tons 2nd crop @ $2.00	4 00
Cost of chemical top dressing for third season	5 95
Cost of cutting 3 1-3 tons hay @ $2.00	6 66
Rent of land, etc., 3 years @ $5.00	15 00
	$66 61

Amount Received.

50 bu. oats @ 50c.	25 00
2,400 lbs. oat straw @ $8.00	9 60
3 tons cured hay, 2nd season, 1st crop @ $10.00	30 00
2 tons cured hay, 2nd season, 2nd crop @ $10.00	20 00
3 1-3 tons cured hay, 3rd season, 1st crop @ $10.00	33 33
Fertilizing value of manure from 5 tons clover hay (less 25 per cent.)	
Nitrogen 156 lbs. @ .18	28 00
Potash 165 lbs. @ .04½	7 42
Phosphoric acid 33 lbs. @ .05	1 65

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Fertilizing value of 3 1-3 tons mixed hay (less 25 per cent.)	
Nitrogen 87 lbs. @ 18c.	15 66
Potash 96 lbs. @ 4½c.	4 30
Phosphoric acid 23 lbs. @ 5c.	1 15
(Fertilizing value of clover and roots turned under not counted is about $20.00)	
	$176 11

The table you will notice covers a period of three years, from the time the clover seed is sown until the hay crops of two succeeding years have been removed. The field has been debited and credited with the items which properly belong to it. Time of man and team has been calculated at 35c. per hour and of men alone 15c. per hour. I think you will see that the figures show a sum decidedly in favor of growing clover if only the financial side was considered. What, then, are the conditions most favorable to the growth of this crop?

First, a well drained soil. Naturally clover roots penetrate to a depth of several feet, and when standing water is encountered by them they stop, "damp off," and go no further. A good deal of the value in growing clover comes from the fact that the roots do go down deeply in the soil and again bring up plant food which has passed beyond the reach of shallow rooted crops. In a poorly drained soil the clover will grow for a time but it usually kills out before the second season—the year when the largest crop should be expected. The water table should be at least 3½ feet below the surface, and when it is not tile drains should be put in before clover introduction is attempted.

Second. Some crops will grow fairly well in a soil quite depleted of its available plant food but clover demands a soil in a fairly good state of fertility before good crops can be expected. It is sometimes necessary to grow and turn under, rye, buckwheat, or some other crop in order to improve the land, before clover can be grown.

Third. Clover is a lime loving plant and does not grow and thrive for any length of time in an "acid" or "sour soil." When this condition exists an application of lime in the amount of 1,500 lbs. to 2,000 lbs. to the acre should be applied. Soils,

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even though they do not show the acidity test by the usual methods, are often greatly benefited by the application of 800 lbs. or 1,000 lbs. of lime at the time of plowing the land, when it is the intention to grow clover upon it.

This matter of a "water logged" soil and an "acid" soil is directly concerned with the helpful action of the nitrifying bacteria. If we are to get the benefit of having these organisms take from the air and store in the soil and in the roots of this crop nitrogen amounting to several hundred pounds to the acre, we must correct both of these conditions for the process of nitrification will not freely go on, and the bacteria will not multiply to any great extent when either condition is present.

Fourth. We should look carefully to the kind and quality of the clover seeds we buy. When a sample of seed will show a germination test of only 75 per cent, it means that one-quarter more seed must be used. In our climate where occasionally the conditions are such that clover winter-kills, it is advisable to use a mixture of clover and grasses. One that is giving us the best of satisfaction at present is: 11 lbs. timothy, 6 lbs. red clover, 4 lbs. alsike clover, and 4 lbs. Kentucky bluegrass or redtop per acre. The wisdom of using this mixture was shown two years ago when our clover killed out. The next season the timothy and bluegrass came on and gave us a yield of 3 1-3 tons of hay to the acre.

Fifth, the fertilizing for clover. Clover has the power and we expect it to skirmish around for its own nitrogen, hence fertilizers used on clover sod should not contain high percentages of this element. Clover demands potash in liberal amounts, therefore the advisability of using this element quite freely. For several years we have been using each spring the following top dressing of chemicals on our clover sod and other grass lands: 300 lbs. nitrate of soda, 300 lbs. muriate potash, 600 lbs. acid phosphate.

These materials are mixed together and applied broadcast at the rate of 300 lbs. to the acre, early in the spring.

For the reasons spoken of in the earlier part of this paper we do not use our stable manure as a top dressing on grass and clover sod.

Sixth. The time of cutting and method of curing clover determines the nitrogen content in the hay, and also the dura-

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tion of the clover plant in the land. Cut in full bloom as compared with that cut at a later stage the differences of composition are as follows:

1. The crop contains less woody fiber when in full bloom.
2. The crop contains its maximum amount of protein when in full bloom.
3. The nutrients in the crop are more evenly distributed.
4. The crop contains its maximum amount of essential oils which impart palatability to the feed.
5. The hay is of a brighter color, more succulent, and is relished better by stock than hay cut at a later period.

Plants when they have produced seed die, their cycle of life having been completed. When cut in the bloom and before any seeds are produced, the roots will produce another set of stems and leaves, hence more than one crop is secured and the life of the plant in the soil is lengthened out.

Seventh. There is still another thing in clover production which must not be overlooked and that is good tillage, proper preparation of the land, and an occasional rotation of crops. If bacteria are to take nitrogen from the air, we must devise means of promoting soil ventilation. The plow and harrow are the chief means at our disposal of aiding in this matter and we should make good use of them.

I have but briefly touched on these essential points in clover production, and have made no effort to explain them minutely for I have taken this subject up before in the presence of many who are here. The observing of these simple directions properly applied to your own farm conditions will enable you to grow abundantly the greatest all-round crop known to the world today.

As time goes on and as we become more familiar with the forces of nature surrounding us, the coming dairyman, I believe, will be known as the "Legume farmer," producing what he uses and taking advantage of things which a knowledge of modern agricultural science places at his disposal. By observing simple directions for caring for the stable manure, by the exercise of good business judgment in the purchase of concentrated feeding stuffs, and by the production and trapping of nitrogen in the clover plant, dairy farming will hold its place as the safest form of husbandry, will build up these so called "worn out" farms

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of New England, and will stop an everlasting, useless, and unceasing drain on what might be the most profitable line of agriculture in this state.

B. W. McKEEN. I came here rather as a listener than to make any remarks. However, as your president has seen fit to invite me to say a few words, I take great pleasure in doing so. The discussions of today, it seems to me, have turned along very practical lines. I mean practical lines for the New England and eastern farmer. The talk this morning, carrying with it so much of thought, so much of observation, so much of experience on the part of the speaker, must come home to every Maine dairyman with a great deal of force. As a matter of fact, friends, I believe it costs but little, if any, more to produce clean milk that it does to produce dirty milk. In the New Hampshire State Dairymen's meeting last year a great discussion arose as to the necessity of the farmer's obtaining more money for his milk because of the extra requirements of the consumer, and very great stress was laid upon the fact that it cost more to produce market milk today than to produce the milk that would answer every purpose in the market years ago, simply along the lines of cleanliness. In my judgment the farmers are seriously in error when they reason in that way. Let us see. One of the first requisites for clean milk is a clean cow stable. A dairy cow will do better work for a longer period of time in a clean stable than in a dirty, damp, dark one. Consequently, is not the producing value of that cow increased more than enough to pay for the extra trouble in keeping the stable clean? It is the same along all the lines in connection with the production of clean milk.

I was very much pleased to hear my old friend, Dr. Smead, speak as he did in relation to the treatment and handling of the dairy cow. While, as some of you may know who are readers of some of our papers, the Doctor and I have not agreed on all the points he spoke of today, primarily we do most absolutely agree. I believe we have fed too much one sided rations. I believe we have looked to the production of the udder, to the production of milk, and overlooked other things in connection with the cow. I am more and more convinced that while the development of the milking function of our dairy cows is absolutely necessary, there are other and

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more fundamental principles that should be considered by Maine dairymen. I do not care how much the milk organs of the cow are developed, I do not care how much the milk function has been encouraged by breeding and feeding, if that cow is one sided in her makeup, if her other organs are not developed in proportion, she is of little practical value in the dairy; she is a subject of abortion, tuberculosis and other diseases, because of the lack of constitutional vitality, of heart and lung power. She becomes a worthless animal for business.

Again, in relation to feeding, for many years Maine farmers have largely overlooked the capacity of their own farms for dairy foods. They have been taught, sometimes to their detriment, to look beyond the farms for their food. We hear our speakers talk along the line of producing clover and other feeds that grow naturally on Maine soils and thrive in the Maine climate, and that I think is one of the most encouraging signs of dairy thought and dairy teaching today. I am looking to see more and more Maine farmers cultivating these acres of ours and getting from them the most nutritious, the most palatable and the best balanced food for all purposes for their dairy cows, and thus overcoming the drain for purchased grain.

W. G. HUNTON. I want to say just a word to emphasize to the practical farmers here the point that has been touched upon in relation to depending on our future herds. Twenty-seven years ago I began with one cow to build up a dairy herd, and for the last fifteen years I have had not less than 25, and today I have not a cow or heifer on the farm (and I have 37) but that I raised myself. And for fifteen years I have not had a three teated cow or a tuberculous cow in my herd. I attribute the freedom of my herd from disease to the fact that I have raised my own heifers and cows and fed them almost exclusively from the production of the farm. I have neighbors who have as large herds as I have, who are constantly obliged to call in the Cattle Commissioners for tuberculosis, who are constantly disposing of three teated cows, and who have two or three times in the last fifteen years had their herds nearly destroyed by abortion, but I have had none of those troubles. The only food I allow myself to buy is some nitrogen in the form of concentrated feeding stuffs, and I never buy beyond what money I get from selling something from the farm, like

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sweet corn, or something of that kind. I believe that the future of our dairying in this section of the State depends on the farmer raising his own cows and feeding with the end in view to produce healthy and good cows. I have two friends in that line, corn and clover. They are perfectly natural to this country, they grow so freely as weeds, if we give them a little encouragement. I have no time nor inclination to bother with any plants which are not indigenous to the climate when I have two such friends. The only thing a farmer can do who thinks he cannot pay a large sum for his original herd is to purchase a good animal for the head of his herd, and then he can produce cows that will bring $75.

JOHN M. DEERING. I have listened with much interest to the address by Dr. Smead. The State of New York is fortunate in having a talking veterinarian. We have a great many veterinarians in this State, but we seldom hear them talk. Although my official business brings me in contact with most of them, I have never seen one of them at our Convention to speak to us. I did not hear Dr. Smead speak of tuberculosis very much in his remarks. I wanted to hear him explain to us if they had any tuberculosis in New York and if they did, how they treated it. We are up against it here, and my associates and I are trying to do the best we can in suppressing it. Perhaps it would be well for me to say a word in that line, because it is in the interests of dairying. I am one of those men who keep cows and who buy cows. I have to buy my supply, I do not raise them, and I am occasionally buying cows that will not stand the tuberculin test. We cannot help that at present but I think we can report here to this Dairymen's Association that the work of the Commissioners is progressing. Last year we were furnished by the United States Government with 6,000 doses of tuberculin and that was used principally for the city of Portland, or for the market supply of the city of Portland. Six thousand cows were tested, and out of those we condemned 206. This year the Board of Health demanded that those same cows should be retested, and the veterinarians have gone over the work again. Six thousand cows have been tested and we have not found over 2 per cent diseased. Last year we found about 8 per cent. That shows a decided improvement. There are sections of the State where we have not done much

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business; there are sections where no disease exists. Those sections are very fortunate. But in some localities where pure blooded cattle were brought in from outside the State years ago to breed for the dairy herds, the farmers were unfortunate enough to bring in diseased animals. Among the pure blooded cattle we found last year 20 per cent of diseased ones. This year those cattle have practically all been retested, and I do not think the per cent will exceed six. I want to say to the farmers of this State that the Commissioners have their thumb on the pure bred cattle, and the records show that we have made a decided improvement in that line. That is the result of the new law passed by the legislature two years ago. I do not know but I am selfish and a little prejudiced, but I believe that the purity and the health of our herds will compare well with any state in New England. There were two towns in New Hampshire this season that wanted to sell their milk in Portland, and in order to do that they had to have their cows tested as though they were owned in Maine. One of our men went there and tested 500 cows and turned down 53, ten per cent.

I think I can report to this Association that as far as tuberculosis is concerned, we stand as well if not better than any other New England state. I want to emphasize that point.

One thing in relation to feeding I heard spoken of by Dr. Smead yesterday. We all know that grain is high this year, higher than it has been for a number of years. If grain were low we would not find much fault with buying it at the prices we get for our product. Wheat middlings are $1.65 and cottonseed about $1.60. I am paying $1.55 for it. I am feeding now two bags of cottonseed and one bag of middlings mixed together. Last winter I fed one bag of middlings, one of gluten and one of corn meal. This winter I am buying cottonseed meal, as I think it is more economical. I have fed it for forty years and I am not afraid to feed it. I can feed it to my cows without injuring them. I want to say right here that the cows in the State of Maine are not fed as high as they ought to be on the average. Some dairymen feed pretty well, others do not feed as well as they ought to feed. I see a great many herds all over the State and I think I know by the condition, by the looks of those cattle, whether they have grain enough. I have visited a place this morning where there are forty as good

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cows as I have seen in the State of Maine for a year, and everything was just as clean as this room, only the floor was not carpeted. Everything was up-to-date and all right. That man is doing business just the way that these people here have instructed him to do it. He is living right up to the teachings of the professors. I wish more of our farmers were practicing those methods.

A. W. GILMAN. I do not think I can add one word to what has been said here. I have never attended a State Dairy Conference where I have been so much interested from the moment I came into the room until the close of the meeting, as I have at this one. I am satisfied beyond a doubt that Brother McKeen was right when he said we certainly were advancing along this line. I have been listening with a great deal of interest to what Brother Deering has said on tuberculosis, and this report is correct. We certainly are ahead of any other state in New England, as far as that goes. The most pleasing part of what he said was that where they tested cows last year and removed the diseased ones, and then went over the same ground this year, they found almost perfect herds.

I trust the farmers and dairymen at this Conference when they go home will resolve to do better work along the line of dairying than they have ever done before. There have been a good many things said and they are worth to us just what we take home with us and apply individually to our business. The man who gets the most out of the Conference is the man who, when he goes home, will resolve within himself that he is going to do better work in dairy lines, give his cow better feed and better care.

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REPORT OF STATE DAIRY INSTRUCTOR.

To Hon. A. W. Gilman, Commissioner of Agriculture:

I herewith submit my final report as Dairy Instructor, for the three months ending March 31, 1907.

It is with much regret that I submit my final report after four years connection with your department, which has always been pleasant and harmonious; a condition which has greatly aided in making my work interesting and, I trust, profitable.

When I began work this branch was entirely new, not only to Maine but to all New England and our plans had to be made from time to time, as necessity required, problems had to be solved as they presented themselves, and in consequence, our progress was necessarily slow. There was no definite plan for improving the quality of Maine's dairy products, though all were agreed that something was needed, because Maine butter had received the condemnation of the marketmen and our sweet cream creameries were receiving altogether too much defective cream for them to pay the high prices and sustain the reputation of their product on the market.

A serious feeling of distrust had sprung up in the minds of the creamery patrons, many feeling that creameries were taking undue advantage of their opportunity in determining the value of their product by the Babcock test at the creamery.

There was no concentrated effort on the part of the Department of Agriculture to improve any of these, or to assist the private dairy butter makers or the cheese makers of the State, except what could be done by institute speakers on the lecture platform, because there were no funds available for that purpose.

We had no law to prevent renovated butter being sold for fresh creamery stock, nor was any department of State charged with the enforcement of the law prohibiting the sale of oleo-

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margarine when made in imitation of yellow butter. The law preventing the sale of adulterated milk was obsolete, and altogether there was a condition of apathy and unrest among the dairymen which meant that sooner or later, our standing would be lowered by allowing our sister states to advance faster than we, and thus outstrip us in the race for the best markets with highest prices, because of lack of high quality and the substituting of imitation products in our own State.

The Dairymen's Association had been, for some time, discussing this condition and realized that something should be done to stimulate new life and create new interest in our most important branch of agriculture. Consequently at the Dairy Conference held at Waterville, December 3, 4, 5, 1902, the following resolutions were adopted:

"*Resolved,* That the welfare of the dairy and creamery interests of Maine requires the appointment of a dairy instructor, whose duties shall be, first, to familiarize himself with the dairy industry in all sections of the State, and by personal work seek to harmonize and make common the interests of all dairymen and creamery men for their mutual benefit; second, to give instruction to butter and cheese makers at the creameries and the farms, and to instruct in and urge better methods in the production and handling of milk and cream; said officer to be under the direction and control of the Commissioner of Agriculture.

Resolved, That R. Alden, Chas. L. Jones and W. J. Thompson be a committee to formulate a bill in harmony with the above resolve, containing an appropriation sufficient to carry out the objects of the bill, and present the same to the legislature.

Resolved, That we pledge our most earnest efforts to promote the introduction of choice dairy stock and the improvement of our dairy product, thereby adding materially to the wealth of the State.

G. M. TWITCHELL,
G. M. GOWELL,
J. A. ROBERTS,
Committee on Resolutions."

In accordance with this request, the legislature of 1903 passed a resolve appropriating three thousand dollars for each of the

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years 1903 and 1904, to be expended by the Commissioner of Agriculture in aiding and protecting the dairy interests of the State, by appointing a dairy expert and such assistants as were necessary.

I had the honor of receiving the first appointment and have noted with satisfaction the changes that have taken place during the four years of work along this line.

Soon after the appointment was made in May, 1903, the officers of the Dairymen's Association consisting of, President, Rutillus Alden, Winthrop; Vice-President, W. C. Whitman, South Turner; Secretary, L. W. Dyer, Woodfords; Treasurer, F. S. Adams, Bowdoinham; Trustee, W. K. Hamlin, South Waterford, were invited to meet at your office to formulate rules to govern the work of the dairy instructor, which were as follows:

"*Rule* 1. He shall take up the work systematically by counties, and one county shall be completed before another is commenced, and requests from other counties for his attendance at any special meeting must be made to the Commissioner of Agriculture, who may or may not grant it, according to his judgment.

The amount of time spent in each county will be governed by the amount of dairying done, and the desire of the dairymen as shown by their co-operation with the instructor for better methods and practices in dairy work.

He shall make monthly reports to the Commissioner of Agriculture on all conditions coming under his observation, none of which will be published that in the judgment of the Commissioner of Agriculture will be to the detriment of any factory or dairyman.

Rule 2. He shall visit every creamery and cheese factory in the county, and will be ready to give any and all information he may possess for the aid and advancement of the industry in the State.

It shall be his duty to co-operate with the creamery managers for better methods, both as regards better products and cheaper production, thus giving better returns to the producer.

He shall take note of the condition of the factory, the machinery and the product, also the sanitary condition of every plant, and gather all statistics possible concerning the industry. It shall be his duty to ascertain if the testing for the dairymen is correctly done at the factory, and it is hoped that all factories will assist in establishing more confidence in the Babcock test by inviting parties to come in and have the Instructor do the testing at the factory in the presence of both buyer and seller. As the testing is at present the greatest point of a contention it is hoped that every factory will accept the good offices of the

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State in this matter, and try to have all see that the test is accurate or can be made so.

Rule 3. He shall visit some patrons of each factory to ascertain the amount of profit per cow in different localities. He shall also assist such patrons as are having difficulty in sending their product in such condition as is required by the factories.

He shall demonstrate the use of the Babcock test, and wherever possible explain to patrons or others the reasons for variations in the test and show that the work of the test may be relied on.

He shall take note of the conditions of the stable, the cows and surroundings where milk is kept and he shall be ready to render all the assistance in his power to improve methods where lacking and strive to bring the dairy practices to a higher standard.

Rule 4. Those dairymen who are manufacturing their product on the farm it shall be his special duty to assist in producing a more uniform product and one that will demand a higher price generally on the market.

The care of the milk, skimming, ripening the cream, churning and working the butter, showing losses of fat in skim-milk and buttermilk, shall receive his special attention.

Rule 5. All dairymen, whether factory patrons or not, who are finding difficulties in their work, of whatever kind, should notify the Commissioner of Agriculture, at Augusta, or the Instructor at Winterport, so that when work is being done in their county they will be sure to receive attention.

Rule 6. He shall assist, whenever possible, those dairymen who deliver milk in cities and towns or are shipping their milk to be delivered by others, in determining the quality of the milk so delivered or sold, that the producer may get credit for such quality as he may produce. Also, when complaints arise in regard to milk not being of standard quality, or containing preservatives or being impure, he shall investigate, and if possible locate the difficulty and assist in having it remedied, and he shall co-operate with the milk inspectors of different cities when they so desire, to accomplish this result.

Rule 7. Whenever a number of persons in a locality so desire he will give instruction and practical demonstration in converting milk into the finished product.

Whenever any grange or farmer's club shall desire an address upon dairy matters, the secretary shall notify the Commissioner of Agriculture, and whenever practicable the instructor will be sent.

He shall work in conjunction with the dairymen's and creamery men's associations for the general advancement of dairying and the placing of Maine's dairy products still higher in the list and increasing the revenue to the dairymen of the State."

It will be seen that these rules embraced a variety of subjects which necessarily meant that his work must be considerably

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divided and with little opportunity to concentrate work on any one branch; a fact which has proved that less subjects could have received better attention, though probably some worthy ones would have suffered, and this condition could only have been overcome by having a larger force at work. Our attention was first directed however, to a condition which existed among the creameries, viz.: The competition had become severe and each was striving to its utmost to hold its present patrons and secure new ones from competitors, until the matter of quality of product had become a secondary consideration, for if one creamery were to refuse the product of a patron on that account, he could take it to a competing creamery and have it accepted. This often meant that the patron would influence enough of his neighbors to go with him to break up a route, and not infrequently whole routes had been known to change because of a reprimand, or threatened cut in price for delivering sour or defective cream.

Not one of the creameries wanted this kind of product but so keen had become the competition, that each was adopting such tactics to secure the influence of disgruntled patrons. Collectors were often responsible for this practice, because in their zeal to secure more patrons and a larger load, which meant more money, they forgot quality, for to them quantity was the factor which increased their pay regardless of the quality of the product they were bringing to the factory.

In view of this condition, an invitation was sent to all the creamery managers in the State, to meet at the office of the Commissioner of Agriculture, with the hope of forming an association which would ultimately overcome this particular difficulty and in other ways assist in improving the quality and conditions generally. As a result such an association was formed and at a subsequent meeting, by-laws were adopted and also a resolution which bound representatives of over ninety per cent of the money invested in creameries in the State, to pay a premium of at least three cents per pound for sweet cream over sour or defective cream, and they also agreed not to take defective cream from a competitor's patron, except at the same discount. This act met with some opposition from patrons and some creameries complained that competitors were not fair, but

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on the whole, the plan worked admirably and during the first year, the quality of the product was greatly improved, nearly every factory reporting some improvement. This meant an increased amount of money paid to the patrons in the State, amounting to many thousands of dollars.

That improvement has continued from year to year until now the average amount of defective cream received at all our factories amounts to less than five per cent, where at the start, it reached as high in some instances as fifty to sixty per cent of the product.

This association has taken up other matters which have been beneficial to the producer by increasing his prices and improving the general standing of our products on the market.

Much time was spent in calling upon the creameries and patrons to become familiar with the condition existing at the creameries and the causes for the distrust on the part of many patrons. An earnest effort was also made to harmonize the interests of the producer and manufacturer by visiting the patrons at their homes.

This work among the creamery patrons of the State has shown excellent results because they were in a mood to sit down and talk candidly over the situation and make suggestions as to what could be done to improve it; a similar interest was found among private butter and cheese makers, and in my judgment, more personal work, if it were possible, would help to inspire confidence in the business. I am of the opinion that our creameries could well afford to become better acquainted with their patrons for this very reason, to say nothing of the knowledge which would be imparted, and the better understanding reached by personal contact.

Institute and grange meetings were attended and talks were made explaining the working of the Babcock test and the method of ripening and churning cream, always emphasizing the necessity for the utmost cleanliness in handling milk and cream and caring for milk utensils.

Special effort was made to have a uniform system of testing at all the creameries. Samples of cream were sent out at different times to the creameries for them to test and report their results, that a comparison of the work could be made.

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The results showed quite a variation from highest to lowest, though the bulk of results varied only within narrow limits, and as a result, there has been adopted a more uniform system of taking samples and making tests.

Many samples of milk were tested at the different meetings, the same having been brought in by different members for that purpose, but the results of this work did little except to demonstrate the test because samples were usually improperly taken and the results were of but little account.

During the first two years, it was our purpose to improve the quality of our dairy products and harmonize the interest of the producer and manufacturer, to work among the dairymen to lead them to better appreciate the possibilities which were hidden in the business and become better acquainted with their needs. We found, however, that the lack of laws for controlling the unscrupulous dealers was a serious handicap in the dairy business, consequently, the legislature of 1905 was asked to make a revision. This was done and at the same time the annual appropriation of three thousand dollars for aiding and protecting the dairy interests was made permanent, several new laws were enacted and others were amended to make them more effective, so that with our present laws, the imitation products can be controlled and adulterations prevented, if a sufficient number of people can be employed to do the work.

A very important law was enacted, which provides that the Commissioner of Agriculture shall inquire into the methods of making butter and cheese in creameries and cheese factories, also the methods of taking, preserving and testing samples of milk and cream in the same, and shall act for the State in the enforcement of the laws relating to the production, manufacture and sale of all dairy products and their imitations. It also gives him and his agents or assistants access to all places of business, carriages and cars used in the manufacture or transportation of dairy products and their imitations, and provides a fine for any one who interferes with or obstructs the Commissioner of Agriculture or his agents or assistants, while in the exercise of their duty.

Another law was enacted which restricts the sale of renovated butter and provides that it shall be plainly stamped, labelled or marked on the outside of every package when sold at retail and

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that it shall not be sold or advertised for sale for other than what it really is. Another, that no article, substance or compound shall be sold if made in imitation of yellow butter or cheese unless made wholly from milk or cream.

Another law provides that oleomargarine shall not be sold when butter is called for, that it shall not be served to guests of hotels, boarding houses, restaurants or lunch carts without customers being notified what it is.

Some very important changes were made in the milk law by striking out the words "knowingly and willfully" which made it necessary to prove that any adulteration had been "knowingly" and "willfully" done, a fact almost impossible to prove.

The law was added to, so that milk or cream cannot now be sold when taken from cows kept in an unclean or unsanitary condition, or when handled or kept in cans or other utensils kept in an unclean or unsanitary condition; it was further amended so that legal or standard milk must contain three per cent fat, nine per cent solids not fat and twelve per cent total solids. By this means, milk rich in fat could not be watered without reducing the solids not fat below the standard and makes prosecutions possible.

However, I am also of the opinion that either the fat standard should be raised to three and one-half per cent. or the solids not fat reduced to eight and one-half per cent, which would make the standard compare more closely with actual conditions than at present.

During the year 1905, an effort was made to inform all dealers in dairy products and their imitations, of the changes in the law, so that if any violations were made, they would be knowingly done.

The dairy laws were compiled and mailed to all dealers whose names appeared in the year-book, also to all the creameries. Abstracts from the laws were published by most of the daily and weekly newspapers of the State, and an effort was made to visit personally these dealers and explain the changes, but with all this effort, when we began to make inspections later, many were found, who disclaimed any knowledge of a law covering the sale of imitation products.

During the past year, the record shows that 1,178 inspections of stores and 270 inspections of restaurants and hotels were

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made and that 250 samples of milk were taken, from which three prosecutions were made, two for serving oleomargarine in restaurants without notifying guests and one for selling milk to which formaldehyde had been added.

In every instance convictions were secured and the defendants duly fined. We have found renovated butter in considerable quantities being sold in the State, but comparatively little oleomargarine is found in the local retail stores, though the high prices of butter drive many to seek a substitute. In most localities, the quality of milk was found to be good but in a few others, the conditions were bad, and I am convinced that our system of local inspection fails to accomplish its desired purpose and I further believe that this work should be done under the supervision of the State, with a system of State registration which would take the inspection out of local politics and place it in the hands of competent men employed for that purpose all the time, going from place to place and liable to descend, at any time, upon the unsuspecting and unscrupulous dealer and the next day be at some other place.

The work of this division has been considerably varied as can be seen, being divided by the rules to cover instruction and inspection work at the creameries and cheese factories; instruction and inspection at the dairies of both patrons of factories and private dairymen; the examination of the methods of creamery testing; the enforcement of the laws regulating the manufacture and sale of all dairy products and their imitations, including prosecutions; the attending of farmers' meetings of all kinds, making addresses and being prepared to give advice as to market conditions, etc.

That our butter product has improved in quality, there can be no doubt. This is attested to not only by our higher scores at the dairy conference and the word of the judges but by the effort of commission houses to secure our product to handle, where a few years ago, they would refuse it.

Especially is it true that the quality of product received at the creameries has greatly improved, which is shown by the reports from every one. Neither is there any doubt about an improvement in methods of creamery testing, or of a better knowledge of making tests by the dairymen of the State. The imitation products are generally sold according to law and there is less

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of adulterated dairy products but to get the best results in this line continual vigilance is necessary.

From the improvements already noted and the evident good feeling existing, it seems fair to assume that the foundation is laid for a better and more profitable future in Maine dairying.

Again I wish to acknowledge the many kindnesses received from yourself and other members of your Department, the officers and members of the Dairymen's Association, the agricultural and dairy press of the State and all others who have aided in making our work pleasant and profitable to the State.

I also wish to extend to my successor my kindest greetings and the assurance of my earnest assistance and continued interest in the future of Maine dairying.

S. C. THOMPSON.

Hon. A. W. Gilman, Commissioner of Agriculture, Augusta, Maine:

DEAR SIR:—I herewith submit my report as State Dairy Instructor from April 1st to December 31, 1907. Having been called very unexpectedly to take up this work, I felt that my first efforts should be made along the line of getting a closer acquaintance with the dairy situation in the State, with some of its greatest needs and working out methods for giving practical assistance.

I am indebted to my predecessor, Mr. S. C. Thompson, for much information and many valuable suggestions and it gives me pleasure at this time to express my appreciation for the help he so freely gave me.

During the summer some little time was spent in visiting different sections of the State, calling upon and obtaining the opinions of many dairymen. While doing this work, I also called at more than half of the creameries in the State and examined into their methods for taking, preserving and testing the samples from the milk and cream of patrons selling to them their product, as well as the methods used in handling this product. In this way, I was able to gather much information, which has been of the greatest benefit to me. I have taken up

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each part of the work under its proper heading, and as the department is charged specifically with certain duties as to the methods of manufacture adopted by creameries and cheese factories, I will take up the inspection of creameries first.

INSPECTION OF CREAMERIES.

During the past nine months I have visited 38 creameries, eight of which I was called for various reasons to visit the second time. The amount of the product received at the creameries remains about the same on the average, some creameries reporting a slight decrease and others reporting an increase, but the really encouraging thing brought out by these visits was the very small amount of cream being received that is defective for sweet cream purposes. I believe, from the information I was able to gather, that the defective cream will not exceed 5 per cent of the total volume received. There has been a constant progress made along the line of better quality. Primarily this has been brought about through the grading of cream as it is received at the creamery, thus emphasizing to the producer the importance of quality. That he has given his active co-operation, the results attest. The amount of butter made, in comparison with the sweet cream sold is each year growing less and less. The high prices realized for butter during the past year, have, however, tempted some creameries to manufacture and sell more than they have for several years. The products of the creameries are being sold in Maine, New Hampshire, Massachusetts and Rhode Island. The demand in Massachusetts for Maine cream is increasing each year. Quite a number of our creameries are shipping large quantities of milk into Massachusetts each year. A ready market is also being found for skim-milk and buttermilk, at good prices. I am convinced that more and more will there be a demand for Maine milk and that gradually many of our farmers will change over from the selling of cream to the selling of milk. The proper collection of milk and cream is receiving considerable attention and the general trend is toward the use of the individual cans, which I believe to be a move in the right direction.

As a whole the methods used in taking, preserving and testing the samples of milk and cream are very satisfactory.

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A few creameries could improve their present methods some, and I believe they will do so. That their testing of samples is giving better satisfaction to the patrons every year, is shown by the fact that during the past nine months, since I have been connected with the department, not a single complaint has been received concerning the test of milk or cream.

As I have been going about among the patrons of the creameries, I have found that as a rule they express themselves as being satisfied with the treatment accorded them.

The U. S. government score cards for the inspection of creameries and the scoring of butter makers are being used in co-operation with the dairy division of the Department of Agriculture at Washington, and I believe they will prove to be of considerable value.

DAIRIES VISITED.

I have visited 61 dairies and have been much pleased with the information I was able to gather, pleased with the progress these men have evidently made and the desire shown on every hand to improve conditions. I have found a splendid spirit, a spirit of progress among the dairymen of the State, and the time seems ripe to make great headway along all lines of agricultural work. It has been decided to give the government score card for the sanitary inspection of dairies a trial with the idea of adopting it if found satisfactory, but so far opportunity has not presented itself to thoroughly prove its value. This will, however, be done very soon. The principal advantages coming from the use of the score card are, first, it leaves with the farmer a copy of the written opinion of the man who does the scoring; second, it protects the farmer against unjust criticism; and third, it keeps the man who does this scoring doing his work carefully and accurately, as he leaves behind him a record of his own competency.

DAIRY TESTING ASSOCIATIONS.

Dairy testing is the most important work the dairyman can undertake and its importance has been taught for many years in this State, without marked progress, until it has seemed that a practical demonstration of its need and worth should be made

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through the organization of co-operative dairy testing associations. Last year, 1906, they were discussed before the annual meeting of the Dairymen's Association, by Mr. S. C. Thompson and the organization of such associations was recommended and the State Dairy Instructor was instructed to make an effort in that direction. As a result of this, some interest was developed but no concerted action taken in any locality until late in October this past year, at a meeting of the Maine State Jersey Cattle Club, the plans and purposes of the Dairy Testing Association were presented to them. Considerable interest was manifested and from this beginning, there has resulted the organization of two associations, one at South Waterford and the other at Winthrop.

The one at South Waterford was formed December 14th, at a meeting called to discuss with the farmers the advisability of such a move. A complete set of by-laws was adopted and the following officers were elected: Mr. L. E. McIntire, Pres.; F. H. Morse, Vice-Pres.; W. K. Hamlin, Sec'y, and Addison Millett, Treas. Monthly meetings are to be held the first Wednesday in each month, for the purpose of discussing the records of the different cows and the problems confronting them in their dairy work.

The association at Winthrop was organized December 26th, with the following officers: W. G. Hunton, Pres.; R. Alden, Vice-Pres.; C. F. Kilbreth, Sec'y and Treas. By-laws were also adopted. A subscription for cows was opened in each instance and a sufficient number has been secured to guarantee the carrying on of the work for a year. It is planned to secure men and commence operations by February 1st if possible. Blanks have been supplied these associations for use in their work and a copy of all records will be furnished the State.

While the actual work on the spot has been done by representatives from the Department of Agriculture the work of creating an interest throughout the State has been accomplished by the co-operation of the agricultural and daily press, the Agricultural College, Dairyman's Association, Granges and agricultural workers everywhere, together with the department, and illustrates very well what can be done when all the forces interested are working not only in harmony but persistently for a definite purpose. Many requests are coming in for lectures

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upon the dairy testing work and this is a good indication of the interest being created throughout the State.

These two associations are organized along the lines of those in operation in Denmark and Michigan, and which the agricultural workers of this State believe to be the best plan so far developed.

MEETINGS.

By special request I have attended twenty-four meetings for the purpose of discussing matters of dairy interest. These meetings have been divided among granges, farmers' institutes, special dairy meetings and meetings of boards of health. I believe attendance upon as many meetings of this character as possible, constitutes a very important part of the dairy instructor's work. It brings one in close touch with not only the aims but the special needs of the farmers in different sections of the State. It also affords opportunities to disseminate the plans of the department for progressive work. Certain it is, that whatever plans may be developed, however good they may be, the execution of those plans must rest with the farmer, hence the great importance of these meetings for organizing aggressive co-operative action, co-operative at least in the sense that there shall be concerted action to accomplish certain results.

I attended the Maine Dairymen's Association meeting held at Auburn in December and was assigned to a place on the program.

I also attended the session of the State Grange held in Lewiston in December and was, I feel, accorded special honor by the State master in being appointed to the committee on dairy interests of Maine as its chairman.

GENERAL.

Since April 1, 1907, Mr. E. L. Cobb, in the employ of this department visited 569 stores, hotels and restaurants in twenty of the cities and larger towns, explaining to the proprietors the laws relative to the sale of milk and imitation butter products. This work was discontinued the latter part of May as it had been in progress since January 1, 1907, and all the cities and larger towns had been visited. I feel that more of this kind of work, educational, will not be needed, as dealers are or ought to be well informed as to the provisions of the State laws con-

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cerning the sale of dairy products and I would recommend that hereafter the efforts of the department be directed toward the investigation of suspected violations of the dairy laws and when wilful violations are found to exist, that prosecutions be made.

It was my privilege during a part of September and October to study dairy conditions and methods in the states of Minnesota, Wisconsin and Michigan. I spent nearly all of the time with representatives of the dairy and food departments of those states in the field, observing actual inspections of creameries, cheese factories, dairies and city milk supplies. In each state a day was spent at the agricultural colleges and experiment stations. In Wisconsin a part of one day was given up to a visit to Ex-Gov. Hoard at Prospect Farm, and I consider that to be one of the most profitable days I spent in the West.

In Michigan, my work included the visiting of members of Cow Test Associations and investigation of their organization and practical workings. I also investigated and became convinced of the value of local breeders' associations such as have been organized in Wisconsin.

Considerable interest is being developed in these associations here in Maine and efforts should be made to organize one or more during the coming year.

While there has been a slight loss in the number of cows in the State during the past year, there has been an average increase in the price received by the farmers for their dairy products, so that the actual cash received for their dairy products has been quite largely increased. The loss in number of cows can be accounted for in some communities by the fact that local buyers have been constantly buying and shipping cows to Massachusetts markets. The development of the Cow Test Association will tend, at least, to keep the best cows at home.

In closing I wish to express my appreciation of the many courtesies and the hearty co-operation I have received at the hands of the agricultural and daily press, the granges, the dairymen of the State and all agricultural workers, as well as yourself.

Respectfully submitted,

LEON S. MERRILL,

State Dairy Instructor.

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REPORT OF STATE ENTOMOLOGIST.

To the Hon. A. W. Gilman, Commissioner of Agriculture.

I have the honor of submitting my third annual report on the injurious insects of the State for the year 1907.

The year of 1906 passed into history as a season of unusual insect activity. During the past few years there has been noticed a gradual increase in numbers of our more common insect pests; this fact was very noticeable during the summer of 1906 and was commented on by many of our orchardists and farmers in general. It was thought by some that the climax had been reached and that our insect enemies, the parasites and fungus diseases, would check their increase and there would be a marked decrease in numbers during the following season. But this was not the case as the season just passed will demonstrate. Without doubt the season of 1907 has been a record breaker in the abundance of many of our common insects.

The increase over last year was very noticeable in the case of the mourning cloak, cherry-tree ugly-nest, red-humped, yellow-necked, and fall web-worm, among the caterpillars. Grasshoppers were so abundant that many young apple trees were stripped of their leaves and beans and even corn suffered greatly from their attack.

We are still free as far as has been ascertained from any invasion of the San Jose scale or elm-leaf beetle.

The men in the field were instructed to keep a close watch while in the orchards for any appearance of the San Jose scale and all nurseries and many orchards have been thoroughly examined for this pest. We are very fortunate thus far in being free from its attack. Many inquiries have been made regarding it and interested parties are constantly on the watch for its appearance so that it will probably be recognized before

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it can become established to any extent in any section of the State.

I am very much of the opinion that the elm-leaf beetle cannot exist in our climate. Many reports have come to me of its occurrence in the State, but thus far these reports have come from parties who are not sufficiently versed in entomology to distinguish this insect from a number of others in the same family.

It is very gratifying indeed to note the growing demand for literature and personal information sought for by our leading farmers and fruit growers in the State. Farmers are beginning to realize the absolute necessity of a thorough knowledge of the life histories of some of our most destructive insects. The National Department of Agriculture at Washington has gradually worked its way to the front and now stands at the head as one of the most important departments in our National Government. The men in charge are constantly working for the best interests of the farmers of our country.

A series of farmers' bulletins was begun in June, 1889, and the serial number has reached No. 313 at the close of 1907. These bulletins have touched upon almost every known subject that pertains to the theory or practice of farming, such as stock raising, dairying, poultry breeding, orcharding, insect control, home life, farm surroundings, food products, and health conditions. These can be secured by those interested by simply writing to the U. S. Department of Agriculture, Washington, D. C.

Our own Experiment Station at Orono is publishing from time to time valuable bulletins and circulars which are sent free to all who ask for them.

In these days of rural free delivery, rural telephones, local granges and a wide awake progressive agricultural press there is not the slightest excuse for a person to remain in ignorance of the most recent discoveries and progressive ideas on the various subjects that go to make home and social life the most enjoyable and successful. The "rut" day has passed and a broader plain is spread before each individual tiller of the soil. In order to gain the success we strive for we must ever be on the alert to grasp each new fact that will lead to greater achievements in our home life.

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INSECTS OF THE YEAR.

About 1,500 specimens were sent in for identification during the year. These were included under 160 different species, embracing all orders of insect life. Among them were the following:—Brown-tail; cecropia; polyphemus; luna; maia; io; forest and apple tent; red-hump; yellow-neck; tussock; fall web-worm; hickory tiger; cherry-tree ugly-nest; three species of Halisidota; Mourning cloak; canker worm; apple aphis; apple borer; apple bud-moth; apple leaf roller; leaf galls; oyster-shell bark lice; galls on apple; a number of different species of sphinx; several specimens of plant lice; galls; saw-flies, elm, pine, birch, fir and willow; pine borers; "Lady bugs;" bean weevil; plum flea beetle; grasshoppers; a large number of injurious moths; cut worms; beetles; flea beetles; strawberry borer; etc., etc.

June 17th a large number of "June Bugs," *Lachnosterna fusca,* were received from Thompson pond, Oxford. The report was that acres of this pond were covered with these beetles so that it was very noticeable when rowing through them.

On July 16th I was asked to examine an elm tree on the East Side in Augusta. This tree had been brought from a nursery in Worcester, Massachusetts, and was badly infested with a species of Coccid, or louse, *Gossyparia spuria,* identified by Dr. Howard. The life history is given by him in "Insect Life," Vol. II, page 36, the old name being *Gossyparia ulmi,* and is mentioned as being imported from Europe. It has never before been reported from this State. The tree was nearly dead, so was removed and burned.

When shade trees are set it would be much safer to take our native trees in preference to those grown in other states. In this way many insect pests might be kept away from our borders. This tree was our common white elm, *Ulmus americana.*

Many of the asters in the different nurseries were badly infested during the month of August by a species of Aphid, *Nectarophora ambrosiae,* a rather large reddish brown aphis which congregate at the junction of the branches and leaves. These can be very easily controlled with kerosene emulsion.

In September one of the field men sent in some insects from York Village that he reported as causing a great deal of annoy-

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ance to a family living there. They had become such a pest as to actually drive the occupants from the house. They proved to be a perfectly harmless insect and were identified by Mr. Banks as *Myopsocus lugens.* They are frequently attracted to a light in large numbers.

In this same month walking sticks occurred in abundance at York, and a number were sent in to the office.

On the islands in Annabessacook pond in Winthrop the oak trees were stripped by the caterpillar *Anisota senatoria.* Much uneasiness was felt on account of it as it was thought to be the gipsy.

September 9th several cocoons of a saw-fly attached to some fir twigs were sent in by Ellen H. Peabody of Machias. These hatched on September 12-13 and proved to be the larch saw-fly, *Nematus erichsonii.*

September 18th twigs of the red pine, *Pinus resinosa,* were received from Mr. Wm. Miller of Bar Harbor infested with small beetles, *Conopthorus coniperda,* a common enemy to the cones of the white pine, *Pinus strobus.* This insect was sent to the department at Washington and Mr. A. D. Hopkins in charge of Forest Insect Investigation reported that it was a new and remarkable habit of this beetle. The insect was boring in the living twig of the pine at the terminal bud. It was reported to be quite common at Bar Harbor.

November 15th Geo. R. Howe of Norway sent in some fine specimens of the "Fig leaf-gall" on white oak, *Borhiza torticornis,* Walsh. These hatched December 26.

INSECT INFESTING THE DAHLIA.

While inspecting the nursery at Bar Harbor my attention was called to the presence of an insect that was "stinging" the buds of the dahlia and causing them to blight, so that it was impossible to secure any perfect blossoms. I went to the place and examined the plants. I found it to be a species of true bug, belonging to the family Capsidæ. It proved to be the very common tarnished plant bug, *Lygus pratensis.* Why this insect should select the buds of the dahlia for this work is not known, or why it should "sting" the bud at all as it couldn't be for the purpose of laying its eggs, as it does not lay them at this season of the year. Mr. Wm. Miller of the Bar Harbor Nursery Com-

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pany stated that he had not been able to successfully raise any dahlias for a number of years. In fact had given it up at least ten years ago.

Later in the season the same insect was reported as doing the same kind of damage in a number of other places in the State. Mrs. Bessie Rupert of Portland brought some to the fair at Gorham asking for information regarding them. She stated that they caused a great deal of damage to her plants, and many buds blighted on that account. Several dahlia growers in Waterville reported the same insect at work on their stock. It is well known that this insect is a very common pest in our gardens injuring many different vegetables as well as flowering plants. It is said that the puncture of its beak is poisonous. The bugs are found throughout the season and are very hard to capture as they quickly take to flight or hide beneath the leaves when approached. They are the most active during the middle of the day, especially when the sun shines.

They are very hard to control on account of their active habits and the fact that they puncture the buds and leaves to obtain the sap, having like all other bugs no jaws to bite with so that about the only thing that would be in the least effective would be a thorough spraying with kerosene emulsion. It is doubtful if this method would be the best in the case of the dahlia. We would recommend the sweeping of the nearby shrubbery with an insect net in the morning and towards evening. Many would be captured in this way.

AMERICAN SILK WORM (SAMIA CECROPIA).

So much has been written regarding this insect that it would seem wholly unnecessary for me to say anything further in relation to it.

Its life history has been written up by almost every entomologist who has contributed anything to American literature. Cuts showing its different stages have been published by almost every magazine, pamphlet, bulletin and report that has appeared as an entomological publication. Nevertheless the number of cocoons received at the office are increasing each year. During the past year we have received about one hundred and eighty.

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Many of them are sent by persons who are quite sure they must be the brown-tail moth nest or some state of the gipsy. Under the circumstances we have thought best to fall into line with the other publications and give its life history together with the cuts which will do away with much descriptive matter.

Plate II, Fig. 1 shows the male moth. The female is generally somewhat larger with a more robust body and narrower antennæ. The average spread of the wings is about five and one-half inches. The moths hatch about the middle of June from the cocoons found on the trees during the fall, winter and spring. The eggs are laid soon after the moth emerges, the female depositing them singly on the leaves of the food plant. This is why the cocoons are found so scattered. The caterpillars feed on many of our hard wood trees, including our fruit trees.

When fully grown the caterpillar measures about three and one-half inches in length. Shown Plate II, Fig. 2. It is of a light green color. Each segment has several wat-like spiny projections enlarged at the ends. These along the back are tipped with yellow with the exception of a pair on each of the second and third segments which are orange-red. On each side of the body there are two rows of a bluish tinge. Although these caterpillars have rather a formidable appearance they are perfectly harmless. They reach their growth in August or the first of September and spin their silken cocoons. The cocoon consists of a very tough silk, made double with loosely spun threads connecting the coats, thus giving them a dead air space for protection from the severe cold of winter.

Plate II, Fig. 3 shows a cocoon cut open and the pupa in position just as it looks after the caterpillar has completed its spinning and thrown off its skin to remain at rest until the following spring. The segments of the body are plainly shown also the rudimentary wings, antennæ, legs, etc.

Although the caterpillars grow to such a size yet as they feed by themselves, usually but one on a tree, they do no appreciable damage.

The female lays about three hundred eggs. But very few of the caterpillars reach maturity as the birds destroy many of them. Several species of parasites help to keep them under control. (See page 216.)

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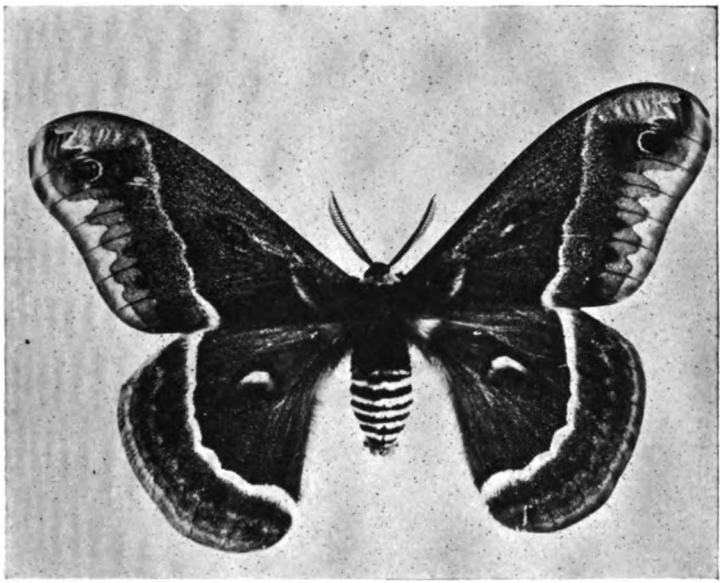


Fig. 1. Male Cecropia, *Samia Cecropia*. (Hitchings)

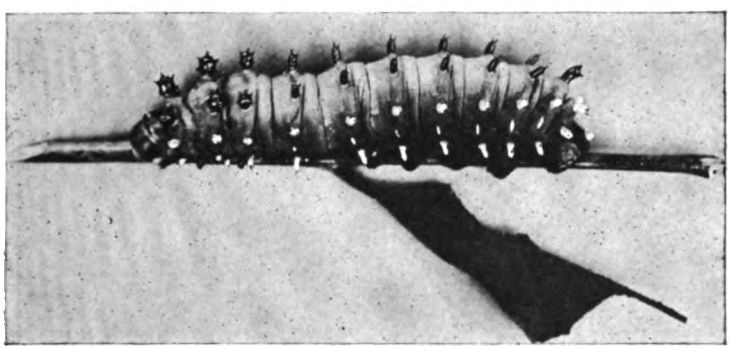
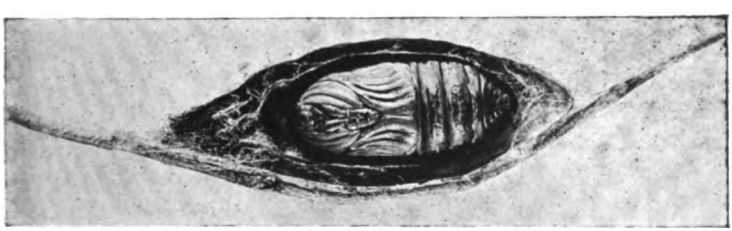


Fig. 2. Caterpillar of *S. Cecropia*. (Hitchings)



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Fig. 3. Cocoon and Pupa of *S. Cecropia*. (Hitchings)

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THE BUCK MOTH.

The Buck moth, *Hemileuca maia,* occurs in a number of places in the State and was first sent to the office in the fall of 1905 from Surry.

Plate III, Fig. 4 shows the different stages in its life history, the cluster of eggs, full grown caterpillar, pupa, male and female moths. These figures are about three-fourths size.

The moth spreads about two and one-fourth inches. The wings are grayish black with a distinct black line on the outer edge and extending along the anterior edge to the thorax. A broad band of white extends diagonally across the wings, being much wider on the posterior ones, covering more than one-half of the area. The antennæ, legs and body are black. There is a pair of brick-red tufts, one on each side, just back of the shoulders, and the male has quite a prominent anal tuft of the same color. This was the distinguishing mark that caused many to believe it was the brown-tail moth.

They generally occur in colonies, the one at Surry being the largest that I know of. The life history is similar to that of many of our other moths. The adult insect appears about the first of October. Last season the first moth appeared September 22nd and the last one October 4th. They are not nocturnal like most moths but fly by day.

The female lays her eggs in a cluster surrounding the twig as shown in the figure. The average number of eggs in a cluster is about one hundred and seventy. These remain all winter and hatch about the middle of May. The caterpillar is dark brown with a yellowish-white line on each side, and is armed with clusters of spines on each segment similar to the io but they are stiffer and more branching. They feed mostly on the oak and birch and will probably never occur in sufficient numbers to become a pest. They have rather a striking appearance, and are eagerly sought for by the amateur collectors, as they are counted among the rare moths of the State.

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IO MOTH.

The io moth, *Automeris io,* is common throughout the State. Numerous letters have been received regarding the caterpillars of this moth.

When full grown it measures about two and one-half inches in length. It is of a light pea-green color and has a lateral brown band about one-sixteenth of an inch wide bordered with white on its lower edge. The white stomata or breathing pores are situated in this band. Each segment has several tufts of green branching spines tipped with black.

Plate IV, Fig. 6 gives a life size illustration of this caterpillar showing the cluster of nettling spines. A sharp stinging sensation is felt if by accident the hand is brought in contact with these spines; this is followed by more or less of an inflammation which is rather annoying in some cases. The different stages of the moth are shown on Plate IV, Fig. 7. The eggs are laid in clusters on the under side of the food plant, soon after the moth emerges in June. The caterpillars are gregarious in their habits, feeding together in the colony until about the last moult, when they become scattered, and after reaching maturity crawl to the ground and spin a thin papery-like cocoon hidden away among the grass and leaves. The cocoon is shown in the left-hand lower corner; the pupa in the upper right hand. The female moth, in the upper left corner, is usually much larger than the male, in the lower right, and is of a rich dark-red color with light markings on the fore wings. The hind wings have the large dark purple eye-spot with a white line centre as a characteristic mark of the species. The male is of a rich yellow color but the markings are so similar to the female, especially the posterior wings that it can be easily recognized as belonging to the same species.

The caterpillar is a general feeder and is found on our fruit trees and many of the hard woods. I have taken it on alder, ash, balm-of-Gilead, birch, choke cherry, oak, sweet fern and willow.

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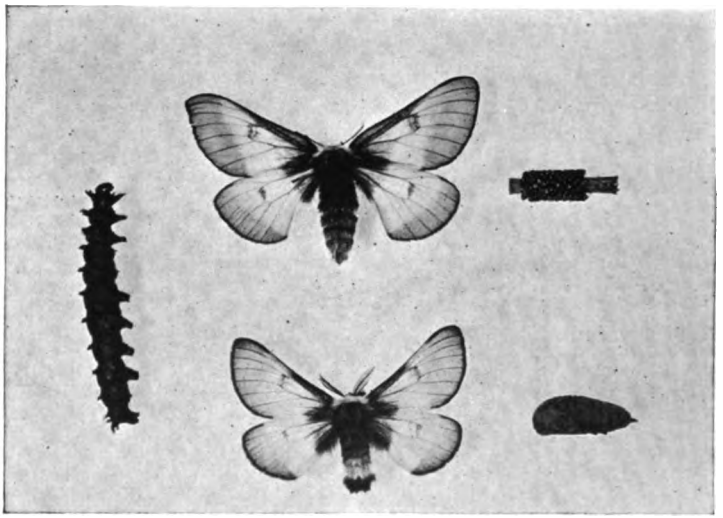


Fig 4. Different stages of the Buck Moth, *Hemileuca maia*. (Hitchings)



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Fig. 5. Caterpillar, Chrysalis and Adult of Mourning-cloak Butterfly, *Euvanessa antiopa*. (Hitchings)

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MOURNING CLOAK BUTTERFLY.

The mourning cloak butterfly, *Euvanessa antiopa,* has become such a pest within the past few years that we deem it best to show its different stages and give a short account of its life history. Since the advent of the gipsy and brown-tail moths into the State this one insect has caused more uneasiness than any other. The caterpillars are sent to the office in great numbers. Their usual food plants are the elm, poplar and willow.

The butterfly as shown in Plate III, Fig. 5, hibernates through the winter and lays her eggs in early summer in clusters on the under side of the leaves. The caterpillars are gregarious and keep together until they reach maturity. They strip the leaves clean as they go, so that whole branches and sometimes whole trees, if they are small, are stripped bare before their presence is known. The butterfly as shown in the cut is somewhat reduced in size. They will average about three inches across the extended wings. The ground color is a rich velvety brown. Near the outer margin of the wings is a broad yellow band with a row of bluish spots within a band of purple just inside of the yellow border. The caterpillars are almost black in color with a row of eight brick-red spots along the back. Each segment is armed with long black branching spines which are stiff and sharp pointed. When mature the larva measures about two inches in length. When fully grown they crawl to some convenient place and spin a small tuft of silk; in this they tangle their posterior pair of feet and gradually work free from the caterpillar skin and appear in the chrysalis form as shown in the figure.

MAPLE BORER.

The maple borer, *Plaginotus speciosus,* is causing a great deal of damage to our shade trees. There is hardly a healthy maple tree in the city of Waterville, and many other places are equally as bad, owing to the presence of this insect. The beetle is about an inch in length. It is a strikingly marked insect and when once identified could never be mistaken for any other. The colors are black and yellow. The head is mostly yellow with black eyes and antennæ; the thorax is black with two lateral transverse yellow bands; the wing covers are about equally

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divided in black and yellow. There is a conspicuous yellow "W" on the center of the anterior portion; one-half of the letter on each elytron. The legs are light yellow.

The female lays her eggs about the middle of July in the crevices of the bark. These hatch and the young larvæ work their way through the bark into the sapwood. Here they remain cutting their way around the tree or in irregular galleries up the trunk, thus sapping the life of the tree. The time to destroy them would be in the spring before they have worked into the wood. Look for the sawdust-like casting and with a sharp knife hunt them out and destroy them. A wire may sometimes be used to great advantage in tracing their course in the wood.

Plate V shows the gallery in a maple stick where the pupa hibernated during the second winter before emerging as a perfect insect. This gallery was made by the larva. The adult beetle is shown in the corner.

INSECT MOUNTS.

A good deal of pains was taken to collect enough material to put up some mounts showing the life history of the brown-tail moth. It was rather a disagreeable undertaking to secure enough full grown larvæ to inflate for this purpose, as it necessitated the handling of several hundred specimens. This required a great deal of painstaking care and as a result those who did the work were bountifully paid for their endeavors by having all the brown-tail rash that could very well come to them. All of the men in the field were fortunate (?) enough to enjoy all of the comforts and some of the discomforts attendant upon such an investigation. Many brown-tail caterpillars were found in company with the gipsy larvæ under the burlap. It was a much easier task to secure the pupæ, moths and egg-clusters; these last were collected in Kittery and York where they could be found in abundance on the leaves.

About two hundred were obtained and have been arranged in suitable mounts for educational purposes. A set comprises an egg-cluster deposited on a leaf of the food plant; a winter nest; an inflated full grown caterpillar; a pupa, the resting

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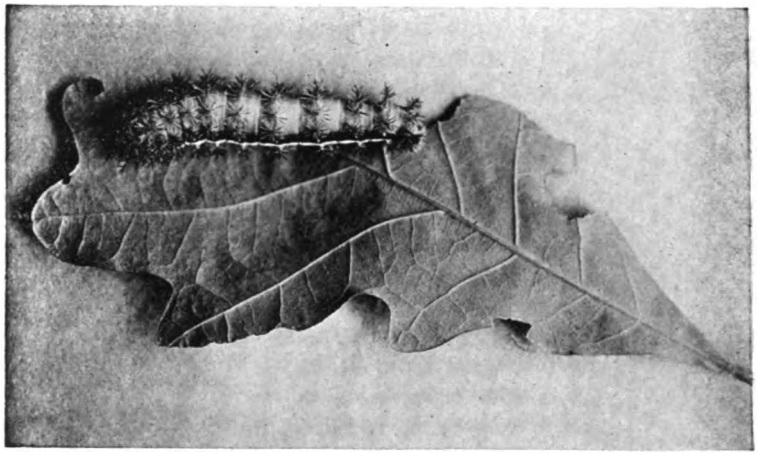
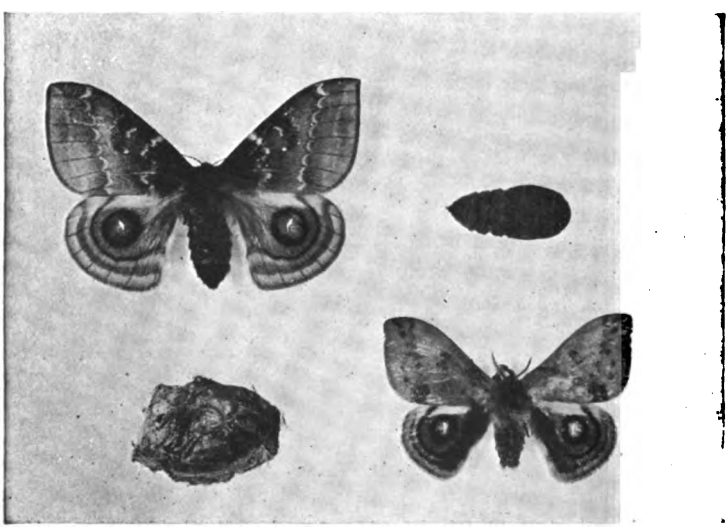


Fig. 6. Caterpillar of Io Moth, *Automeris io.* (Hitchings)



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Fig. 7. Cocoon, Pupa, Male and Female Moth, *Automeris io.* (Hitchings)

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stage before they emerge as a moth, and a pair of moths, male and female.

These life histories are put up in mounts 5 x 6 inches and are shown in the illustration, Plate VI.

A few sets showing the life history of the gipsy were put up (see Plate VI), with the same object in view, but for the lack of material the work will have to go over until another season.

The desired number of caterpillars were inflated and enough egg-clusters will be secured this winter and the other stages another summer, so that the full complement of sets may be ready for distribution together with the brown-tail moth. It is planned to loan these to the schools of the State so that the pupils may become familiar with the different stages of these two pests. With the knowledge thus gained a much more efficient quarantine may be established.

Each stage is labeled from the egg-cluster to the mature insect so that one can become acquainted with the whole life history of these two pests. A descriptive circular will accompany each mount so that the teachers may be able to fully explain them. We realize that this is one of the best ways to disseminate information along these lines. Some of these mounts have been sent out and others will follow as fast as they can be prepared.

PARASITES.

Among the parasites that have come under our observation during the past season are the following:—

On July 2nd polyphemus larvæ were found badly infested with the maggots *Exorista futilis,* a parasitic fly. On April 9th a polyphemus cocoon was received at the office from the town of Alfred. A hole had been made through the cocoon, evidently by some bird, and about one-third of the pupa had been eaten out. It was still alive and remained so for several days.

The larvæ of *Vanessa atalanta* were infested with the parasitic fly, *Exorista futilis.*

Tent caterpillars were quite badly attacked by the parasitic fly *Tachina mella.*

February 15th red-humped caterpillars were received badly parasitized by the Hymenopterous insect, *Exorista chelonia.*

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The parasites on this species seem to be increasing to quite an extent.

A large number of gipsy caterpillars were sent in by the field force badly infested with the eggs of some species of Tachinid fly, but for some reason the eggs did not hatch, or if they did the maggots did not develop so as to destroy the caterpillars. It is presumed that the fly must have lacked instinct and tackled the wrong host, getting hold of a customer too tough for its progeny.

The usual native parasites worked to some extent on the brown-tail caterpillars, but not enough to cause any appreciable diminution in their numbers.

Several specimens of the two common Pimplas, *P. pedalis* and *P. conquisitor,* emerged from the pupæ of the brown-tail moth.

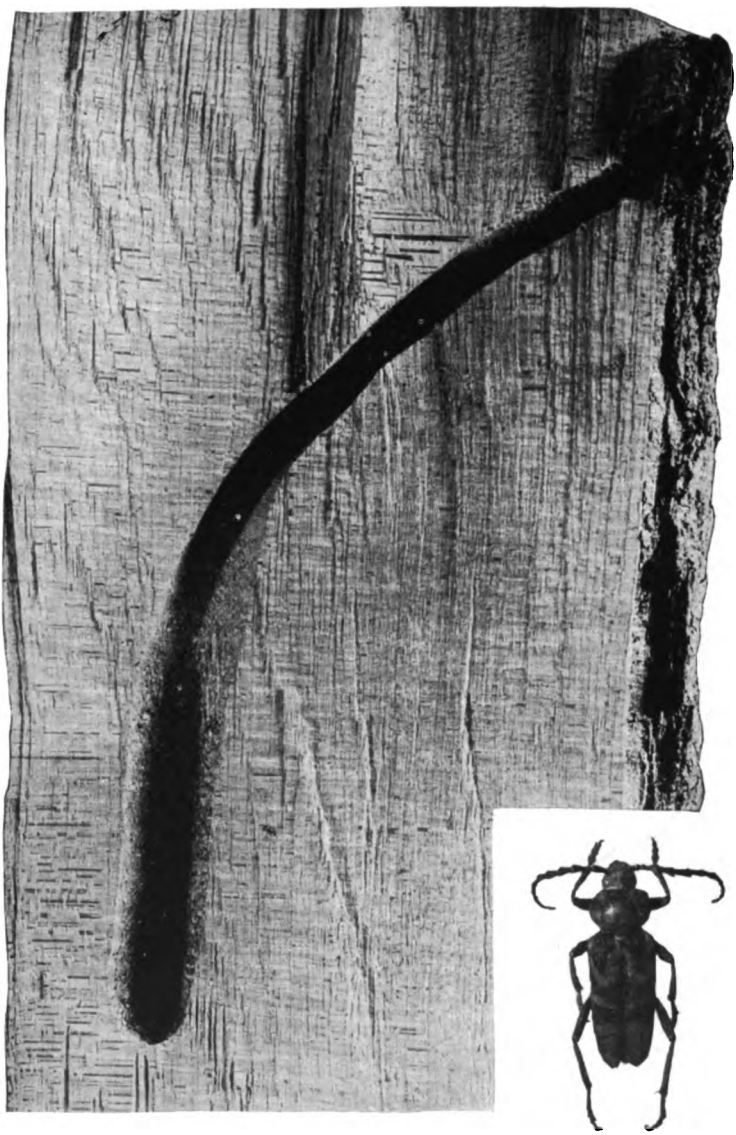
The parasitic fly, *Frontina frenchii,* is a very common enemy of the cecropia. They resemble the common house fly so that they would be easily mistaken for that species by the untrained entomologist.

The fly lays her eggs on the caterpillar. When these hatch the minute maggots work their way into the body of their host and there feed until they reach maturity. In the meantime the larvæ has reached its growth and spun its silken cocoon and changed to the pupa stage. The maggots work their way out of the pupa skin of the host and then change to the pupa state within the inner cocoon of the cecropia. Here they remain until they emerge as a perfect fly. We have counted thirty-nine pupæ of this fly in the cocoon of one cecropia caterpillar. They succeed in keeping this insect somewhat under control.

On February 16th a cluster of parasitic cocoons taken from a cecropia were sent in. These hatched later and proved to be *Cryptus extrematis.*

Another parasite on the cecropia is the large single parasite, *Ophion bilineatus,* which lays a single egg in the body of the caterpillar. Upon reaching maturity this parasite forms a single silken cocoon within the body of the host pupa and emerges the following spring as an adult insect. These are more common on the polyphemus.

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Maple Borer and Gallery

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Another quite effective agent for the same work is the little Chickadee who is with us as our best bird friend through the winter months, as a very important factor in insect control. Miss Mattie Wadsworth reported seeing Chickadees eating the contents of three cocoons of cecropia near her home in Manchester.

Mr. Geo. Yeaton saw one of the birds busily at work on one of the cocoons. The little fellow would pick away a while and then try to tear the tough fiber by scratching at the opening. It took it about fifteen minutes to get through the two layers of the cocoon. When it finally succeeded it gave a little sharp cry and another bird flew quickly to the cocoon. Immediately a pitched battle ensued, but the real owner finally succeeded in driving away his antagonist and then settled down to enjoy his feast of good things.

Both the downy and hairy woodpeckers have been known to feed on these pupæ.

INSECTS COLLECTED FROM UNDER THE BURLAP.

Beside the gipsy larvæ many other insects were taken from under the burlap. The following are a few that were mentioned by the men:—"June bugs;" several weevils, a specimen of the "Searcher," *Calosona scrutator,* also a number of the "Fiery Hunter," *C. calidum;* two species of Buprestid beetles; flat-headed borer, *Chrysobothris femorata;* round-headed borer, *Saperda candida;* scavenger beetles, *Silpha surinamensis;* large Prionids, *Prionus laticollis,* and *Orthosoma brunneum;* Elater or snap beetles, several species; *Osmoderma scabra;* oak pruner; *Elaphidion villosum;* rove beetles; several species of the firefly family; several borers; many of the common ground-beetles including *Harpalus caliginosus; Ips fasciatus* was quite common; cockroaches; spice bugs; cut worms; geometrid larvæ; Catocala larvæ; tussocks; woolly bears; "Lady bugs;" grasshoppers; ichneumon flies; hickory tiger moths; saw-fly larvæ; and many others not identified.

Of course no accurate record was kept of the insects found under the burlap as the men were too busy for that. There is no doubt but that it would pay every orchardist to try the experiment on his fruit trees. By looking at the burlaps occa-

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sionally he could judge whether it paid or not by the character of the insects found. Many codling larvæ could be taken in this way, as they would seek such places to pupate in.

STATE COLLECTION.

Many specimens have been added to the collection during the year. These have been identified as far as possible and will be arranged in their proper families as soon as possible. So many letters were received asking for information on the different insects sent in that it was quite an undertaking to give the required information to say nothing of keeping a record of the collection up to date. This was impossible during part of the season so that quite a lot of material still remains to work on. It is very important that this work should be carefully done as many come to consult the collection for the purpose of identifying specimens. The value of a State collection cannot be over estimated, and we trust that all collectors in the State will recognize the value of it and endeavor to contribute any rare specimens from their several localities that they can spare so as to help enrich the cabinets at the office. Credit will be given for all such contributions and we hope many will avail themselves of the opportunity of rendering valuable assistance in this line.

The life histories of many of our insects are being worked up, and the laboratory work in the insectary during the past season was especially valuable along these lines.

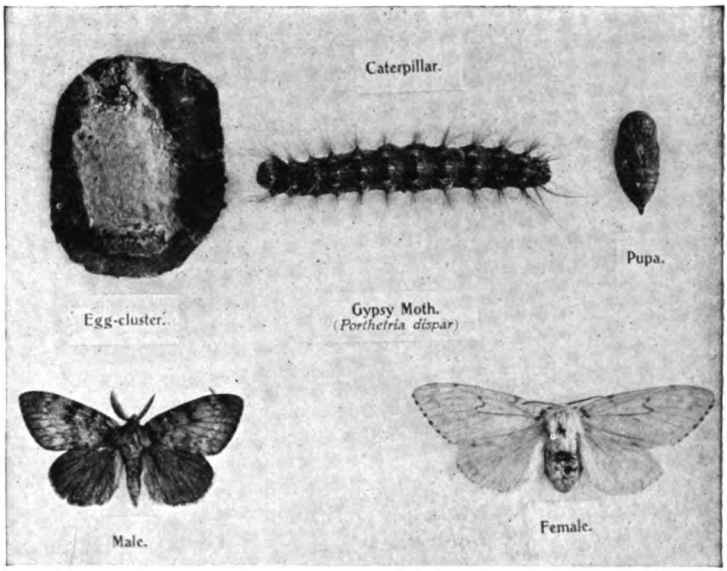
We are very anxious to secure eggs and larvæ of many of our common insects pests as well as those that are classed as rare. Will not our friends help us out in this matter?

We should like to add several more names to our list of those who are interested in entomology who will act as corresponding field agents. In this way we will be able to gain a great deal of information that will be of inestimable value to our farmers and orchardists.

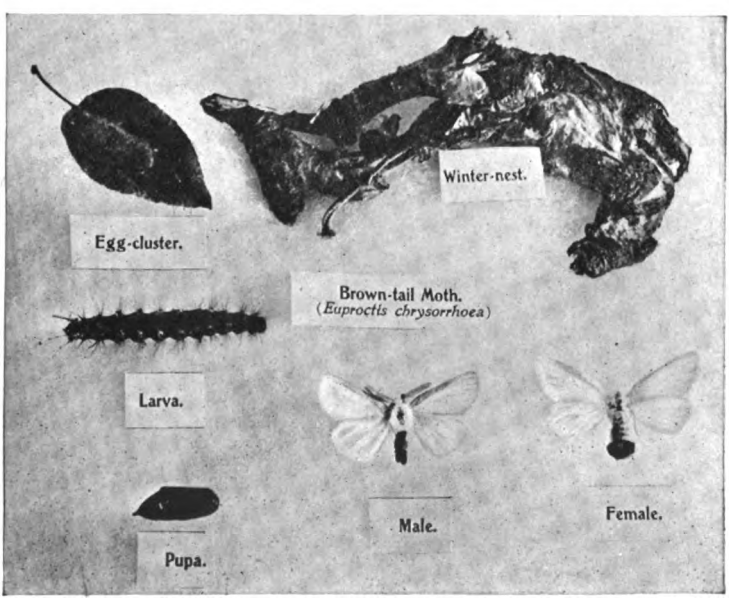
BROWN-TAIL MOTH.

Since the passage of the revised act of 1907 the brown-tail moth question has become much simplified and the several cities and towns in the infested district have taken hold of the work in earnest, with the result that at the present time the situation is very hopeful. From returns made to date it is safe to pre-

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Life History of Gipsy Moths, *Porthetria dispar*. (Hitchings)



MAINE FARMER PRESS, AUGUSTA

Life History of Brown-tail Moth, *Euproctis chrysorrhœa*. (Hitchings)

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dict that the number of nests has been reduced more than fifty per cent. Hardly a nest has been reported from the tier of towns along the northern border of the infestation, and there has been no further spread reported.

For the benefit of those who have not seen a copy of the law we will quote the section pertaining to brown-tail work.

"Section 7. Should any person in the state suspect the presence of the brown-tail moth or San Jose scale preying upon trees, shrubs or vines in his possession or within his knowledge he shall forthwith notify the commissioner of agriculture to that effect; and it shall be the duty of said commissioner to cause the said trees, shrubs or vines to be inspected. If sufficient cause be found the commissioner of agriculture shall forthwith notify the municipal officers of the city or town where such pests have been found. Municipal officers thus notified shall immediately cause to be destroyed such of the above named insects in their different stages as may be found within the limits of public streets and parks. Should such municipal officers neglect or fail within a reasonable time to perform the duties herein imposed upon them then the commissioner of agriculture, with the advice and consent of the governor and council, shall order such city or town to proceed to destroy the above named insects in accordance with methods to be prescribed by him and to spend such an amount in the above named work as he shall deem necessary, not exceeding, however, during any one full year, one twentieth of one per cent of the tax valuation of said city or town for the preceding year.

Any city or town failing to comply with the directions of said commissioner in the performance of said work and the expenditure of such money within the time specified by him, then the commissioner of agriculture shall cause the said work to be done and shall charge the actual expense of the same to said city or town; the amount, however, not to exceed one-twentieth of one per cent of the total valuation of such city or town, such amount to be collected as a state tax.

Whenever a city or town is notified by the commissioner of agriculture of the presence of the brown-tail moth or San Jose scale, the mayor of each city and the selectmen of each town shall notify each owner of real estate located therein, requiring him to destroy the above named insects on his orchard and shade trees within a specified time. If the owner fails to destroy the above named insects before the specified time, then the city or town, subject to the approval of the commissioner of agriculture, shall destroy them, and shall assess upon such aforesaid real estate the actual cost of so doing, to an amount, however, not exceeding one-tenth of one per cent of the assessed valuation of the above named property. The amount so assessed shall be collected in the form of taxes.

It shall be the duty of the commissioner of agriculture to disseminate information concerning the brown-tail and gipsy moths, San Jose scale and other injurious insects or plant diseases.

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Cities and towns may raise the sums necessary to carry out the provisions of this section in the same manner in which money is raised for other necessary municipal purposes."

This section points out clearly the duties of the cities and towns also those of private property holders.

In order to show the thorough work done by some of the towns I will quote from an article that appeared in the "Old York Transcript" in its issue of January 18, 1907. The paper came out with the following headline:—"120,000 BROWN-TAIL NESTS DESTROYED IN A SINGLE DAY."

"That is York's Record for Saturday when $500 was Distributed Among Boys for Gathering Nests and this is Only a Beginning." (See Plate VII.)

"Over 120,000 brown-tail moths' nests destroyed in York in a single day! That means the destruction of probably 30,000,000 caterpillars that would have hatched out in the spring to do irretrievable damage to the trees of York.

These startling figures represent what the Improvement Society is doing in York. For the second season it has stepped forward and taken the initiatory in instituting a campaign against these destructive pests.

Through its agent, J. Perley Putman, the society has paid out in the past few days over seven hundred dollars for moths' nests. Saturday was the first day on which payments were made. For several weeks the boys, and in fact many of their elders have been busy gathering nests.

Saturday beheld the first large invoice of specimens, and during the day the accumulation in the basement of the Realty building at York Village reached the enormous aggregate of 120,000.

Even with a large corps of counters it took the greater part of the day to get through the enormous pile to ascertain the totals, and the record it established probably beats anything previously heard of in this peculiar sort of an industry in the country.

They were brought to the building in all sorts of conveyances —in paper bundles, sacks, baskets and even wagon loads. At one time there were about thirty boys in line depositing their bundles and patiently waiting their little credit slips which would entitle them to cash payments in the office up stairs. The

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PLATE VII



MAINE FARMER PRESS, AUGUSTA

There are 120,000 Brown-tail Moths' nests in this pile, gathered by the boys of York and brought to the Improvement Society at York Village in one day. Among the boys was distributed $500, one obtaining for his lot of 13,000 nests, $52.00.

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scene was a strange one and furnished abundant liveliness and interest.

The largest lot was that brought in by Russell Lucas who had 13,400 and received in payment therefor over $52. The next largest number was the contribution of Roy Plaisted and Willis Baston whose efforts in partnership secured 11,000 nests for which they received $44. Other lots varied in number from 100 to several thousands, and the total was something over 120,000 nests.

On the following day the nests were removed into a great heap outside, sprayed with five gallons of Rockefeller fluid and the torch applied. Thus was York rid at one single fell blow of an army of over thirty million of these voracious caterpillars which in hatching out next spring would have equaled in number enough to lay waste every deciduous tree in the town.

But this is only the beginning. Last season the number destroyed in this manner reached scarcely more than 200,000 for the whole season, while there is no record of the additional results from other methods adopted by the town."

This is a good object lesson and establishes a record far beyond that of any other town in the district.

Another instance is that of Mr. Tobey's orchard at Greenacre, Eliot, where on April 18th seven bushels of nests were taken.

The life history of the brown-tail has appeared in so many publications sent out from this office that it would seem wholly unnecessary to repeat it here. I will simply give a brief account in order to explain the few illustrations here given.

Fig. 8 shows a winter nest of the brown-tail caterpillar. This is constructed in the fall, simply as a place in which to hibernate during the cold period of winter. The caterpillars are dormant during the whole period and by instinct remain in that condition for some time in spite of varying conditions of temperature.

It is a well known fact that many insects freeze up during the winter and remain in this stage until the warmth of spring restores them to vitality again. I will cite one familiar example known to most farmers. It very often happens that when a hollow tree is cut in the winter the rotten portion of the space will contain a colony of ants, so completely frozen as to be covered with frost and ice. If these are carried into a warm

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room they will soon revive and crawl around as if nothing had happened to stop the action of their vital functions. The ants belong to the highest order of insect life, and if a temperature of —40° doesn't deprive them of the vital spark it is safe to conclude that any of the lower orders could stand a like condition.

Many people thought that the weather conditions of last winter were such as to destroy the brown-tail larvæ in the State. From a careful examination made in the spring I found that of

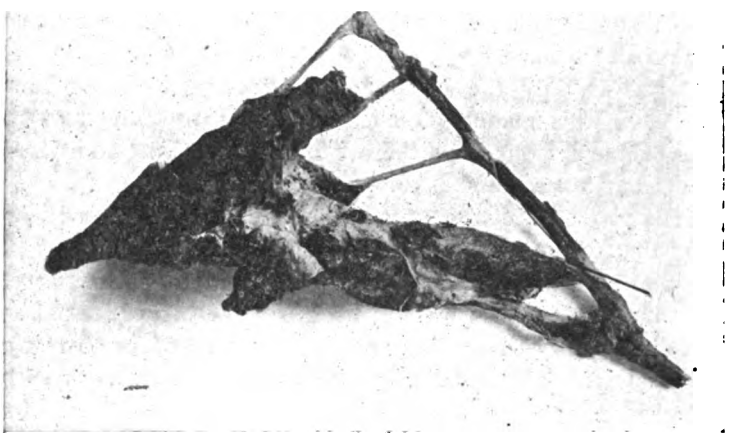


FIG. 8.

ten nests examined from Bar Harbor containing 3,322 caterpillars only 13 per cent were dead. In ten nests from Georgetown containing 3,157 caterpillars about 11 per cent were dead; while from Oxford and Augusta quite a number of nests gave no live caterpillars. Of course last winter was a very exceptional one. Almost invariably the small colonies showed a much greater per cent of dead larvæ than the large ones.

It is just the same in wintering bees. Very often a small colony will not winter well, while a strong one will come through all right.

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Fig. 9 shows a life size cut of the brown-tail caterpillar. The young larvæ leave the winter nest about the first of May and

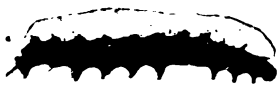


FIG. 9.

feed until the last of June. This season the first larva was seen crawling on April 29th, and the first to pupate was on June 25th.

On July 20th one of the field force, while tending burlaps for the gipsy caterpillars, killed four hundred brown-tail moths.

Fig. 10 shows a cut of the female moth. Her eggs are



FIG. 10.

usually laid in a leaf as shown in Fig. 11. These clusters generally contain about three hundred single eggs. They hatch in



FIG. 11.

August into the tiny caterpillars that proceed to construct their winter home.

Do not expect to see brown-tail moths at any time except in July, the last two weeks, possibly the first week in August, depending upon the season.

On July 22nd a female moth was seen depositing her eggs at York.

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Do not expect to find brown-tail moth caterpillars in any other months than May and June. If people would only remember what they read it would save a world of worry and trouble.

BROWN-TAIL FUNGOUS WORK.

June 11th Prof. Roland Thaxter furnished spores from an Isabella larva which he had found infested with a fungous disease. He inoculated about two thousand brown-tail caterpillars nearly full grown with the spores of this disease and these he gave to our field men to spread around in a badly infested wood lot of oak trees near his summer residence at Cutts Island in the town of Kittery. These caterpillars were liberated about a dozen on a tree. They immediately ascended the trees in search of food. These so inoculated the others that on the 29th of June they could be seen hanging in clusters by the thousands from the under side of the limbs. These were all dead from the effects of the disease. About fifty acres of trees were so treated. As a result of this work the brown-tails were nearly exterminated in the immediate vicinity. This fall on looking through this wood lot hardly a nest could be found, where before the trees were literally filled with them. The same work will be continued during the coming summer as far as may be possible. Prof. Thaxter has kindly offered to furnish the resting spores to use in inoculating the larvæ.

The following table shows the appropriation made by the cities or towns; money expended and number of nests taken in the brown-tail moth work for 1907 as far as reported.

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ANDROSCOGGIN COUNTY

Town.	Appropriation.	Amount Expended	Nests taken.
Auburn	–	$75.00	
Durham	$200.00	90.00	4,500
East Livermore	100.00	20.44	
Greene	25.00	0.47	47
Leeds	–	10.00	86
Lewiston	–	45.00	1,500
Lisbon	–	40.00	
Mechanic Falls	100.00	10.36	332
Poland	100.00	75.00	11,374
Turner	–	20.00	20

CUMBERLAND COUNTY

Bridgton	$100.00	$146.20	1,462
Brunswick	300.00		16,088
Cape Elizabeth	–	52.55	
Cumberland	50.00	50.00	5,000
Falmouth	200.00	153.74	15,374
Freeport	50.00	57.00	6,840
Gorham	343.17	189.25	18,930
Standish	–	60.65	6,065
Westbrook	–	242.58	12,928
Gray	100.00	167.43	6,456
Harrison	100.00	10.00	
New Gloucester	–	381.13	9,144
No. Yarmouth	50.00	32.77	1,142
Otisfield	50.00	45.00	125
Pownal	–	22.80	1,824
Raymond	–	42.94	2,400
Windham	100.00	73.00	5,600
Yarmouth	100.00	158.97	14,591

FRANKLIN COUNTY.

Farmington	–	$20.00	27
Jay	–	15.00	10
Wilton	–	20.00	
Industry	–	14.00	

HANCOCK COUNTY

Castine	$25.00	$8.00	400
Cranberry Isle	25.00	61.10	854
Mt. Desert	458.00	225.00	1,833
Sedgwick	–	14.00	56
Hancock	–	3.00	20
Lamoine	–	12.00	135
So. West Harbor	–	12.00	
Surry	–	38.00	500

KENNEBEC COUNTY

Albion	–	$19.00	30
Augusta	–	73.05	
Belgrade	–	7.50	100
Chelsea	$75.00	28.20	175
China	–	25.00	
Farmingdale	50.00	48.15	1,420
Fayette	–	10.00	50
Gardiner	150.00	100.00	5,300
Hallowell	–	64.65	632
Litchfield	100.00	22.29	1,865

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KENNEBEC COUNTY—Continued.

Town.	Appropriation.	Amount Expended.	Nests taken.
Manchester	–	17.00	480
Monmouth	100.00	75.00	1,500
Mt. Vernon	–	15.00	43
Randolph	50.00	8.24	162
Readfield	–	2.48	87
Sidney	–	30.00	
Wayne	20.00	8.95	179
West Gardiner	50.00	48.31	1,729
Winslow	200.00	55.00	
Winthrop	100.00	25.37	150

KNOX COUNTY

Camden	$100.00	$120.00	4,900
Cushing		21.55	1,400
Friendship	40.00	24.35	2,435
Hurricane Island	10.00	5.00	–
No. Haven	–	15.72	–
Rockport	–	117.98	401,300
St. George	75.00	52.77	5,277
So. Thomaston	–	10.00	–
Thomaston	200.00	174.00	500
Union	100.00	50.00	–
Vinalhaven	–	36.25	2,000
Warren	200.00	180.00	9,000

LINCOLN COUNTY

Alna	–	$17.25	4,080
Boothbay	$ 50.00	44.35	13,800
Boothbay Harbor	75.00	75.00	9,000
Bremen	–	18.42	1,842
Bristol	150.00	96.55	18,000
Damariscotta	50.00	25.00	2,700
Dresden	50.00	46.90	2,345
Edgecomb	50.00	40.65	4,500
Jefferson	50.00	40.70	700
New Castle	50.00	9.00	1,080
Nobleboro	50.00	12.02	–
Southport	25.00	39.60	2,310
Waldoboro	–	6.00	–
Whitefield	50.00	41.50	830
Wiscasset	50.00	38.53	4,620

OXFORD COUNTY

Brownfield	–	$14.62	150
Buckfield	$100.00	36.00	200
Denmark	–	11.50	31
Hartford	75.00	23.00	36
Hebron	–	3.65	300
Hiram	–	13.00	152
Lovell	–	6.00	21
Norway	300.00	63.98	–
Oxford	100.00	21.70	63
Paris	300.00	30.00	45
Porter	–	7.00	300
Sumner	134.46	12.00	–
Sweden	25.00	8.00	64
Waterford	100.00	100.00	–
Woodstock	100.00	9.90	20

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SAGADAHOC COUNTY

Town.	Appropriation.	Amount Expended	Nests taken.
Arrowsic	–	$ 15.00	3,500
Bath	$300.00	290.84	8,206
Bowdoin	–	44.74	1,073
Bowdoinham	100.00	52.06	4,206
Phippsburg	150.00	82.56	13,000
Richmond	–	16.35	575
Topsham	–	103.00	4,944
West Bath	25.00	–	100
Woolwich	100.00	60.42	4,992

WALDO COUNTY

Belfast	–	$ 30.00	Few
Islesboro	$ 50.00	18.00	100
Liberty	–	20.00	–
Lincolnville	–	6.75	Few
Northport	–	21.00	185
Searsmont	20.00	29.60	539

WASHINGTON COUNTY

Cherryfield	$ 50.00	$ 30.00	100
Steuben	–	12.00	–

YORK COUNTY

Acton	$150.00	$152.20	42,000
Alfred	150.00	144.00	7,500
Berwick	114.65	129.00	–
Biddeford	–	648.05	25,000
Buxton	250.00	117.40	11,700
Cornish	–	24.41	1,800
Dayton	24.55	16.35	2,500
Eliot	–	164.54	Many
Hollis	–	87.80	–
Kennebunk	800.00	807.62	–
Kennebunkport	250.00	218.00	–
Kittery	1,000.00	835.47	–
Lebanon	50.00	68.00	1,826
Limerick	100.00	81.89	8,189
Limington	300.00	100.00	800
Lyman	150.00	76.80	–
Newfield	106.00	52.05	2,800
No. Berwick	200.00	146.54	–
Old Orchard	–	35.00	6,000
Parsonsfield	300.00	125.00	1,700
Saco	350.00	500.00	–
Sanford	500.00	565.00	84,744
Shapleigh	–	75.00	9,000
So. Berwick	568.00	499.22	9,000
Waterboro	50.00	131.70	14,679
Wells	200.00	234.00	–
York	1100.00	996.63	239,184

For the benefit of those who think it would be safe to scatter the eggs of the gipsy or brown-tail moths, we here insert the national provision regarding the matter.

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A NATIONAL ACT.

[PUBLIC—No. 234.]

An Act To prohibit importation or interstate transportation of insect pests, and the use of the United States mails for that purpose.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That no railroad, steamboat, express, stage, or other transportation company shall knowingly transport from one State or Territory into any other State or Territory, or from the District of Columbia into a State or Territory, or from a State or Territory into the District of Columbia, or from a foreign country into the United States, the gypsy moth, brown-tail moth, leopard moth, plum curculio, hop plant-louse, boll weevil, or any of them in a live state, or other insect in a live state which is notoriously injurious to cultivated crops, including vegetables, field crops, bush fruits, orchard trees, forest trees, or shade trees; or the eggs, pupæ, or larvæ of any insect injurious as aforesaid, except when shipped for scientific purposes under the regulations hereinafter provided for; nor shall any person remove from one State or Territory into another State or Territory, or from a foreign country into the United States, or from a State or Territory into the District of Columbia, or from the District of Columbia into any State or Territory, except for scientific purposes under the regulations hereinafter provided for, the gypsy moth, brown-tail moth, leopard moth, plum curculio, hop plant-louse, boll weevil, or any of them in a live state, or other insect in a live state which is notoriously injurious to cultivated crops, including vegetables, field crops, bush fruits, orchard trees, forest trees, or shade trees; or the eggs, pupæ, or larvæ of any insect injurious as aforesaid.

SEC. 2. That any letter, parcel, box, or other package containing the gypsy moth, brown-tail moth, leopard moth, plum curulio, hop plant-louse, boll weevil, or any of them in a live state, or other insect in a live state which is notoriously injurious to cultivated crops, including vegetables, field crops, bush fruits, orchard trees, forest trees, or shade trees, or any letter, parcel, box, or package which contains the eggs, pupæ, or larvæ of any insect injurious as aforesaid, whether sealed as first-class matter or not, is hereby declared to be nonmailable matter, except when mailed for scientific purposes under the regulations hereinafter provided for, and shall not be conveyed in the mails, nor delivered from any post-office, nor by any letter carrier, except when mailed for scientific purposes under the regulations hereinafter provided for; and any person who shall knowingly deposit, or cause to be deposited, for mailing or delivery, anything declared by this section to be nonmailable matter, or cause the same to be taken from the mails for the purpose of retaining, circulating, or disposing of, or of aiding in the retention, circulation, or disposition of the same shall, for each and every offense, be fined, upon conviction thereof, not more than five thousand dollars or imprisoned at hard labor not more than five years, or both, at the discretion of the court. *Provided,* That

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nothing in this Act shall authorize any person to open any letter or sealed matter of the first-class not addressed to himself.

SEC. 3. That it shall be the duty of the Secretary of Agriculture, and he is hereby authorized and directed to prepare and promulgate rules and regulations under which the insects covered by sections one and two of this Act may be mailed, shipped, transported, delivered, and removed, for scientific purposes, from one State or Territory into another State or Territory, or from the District of Columbia into a State or Territory, or from a State or Territory into the District of Columbia, and any insects covered by sections one and two of this Act may be so mailed, shipped, transported, delivered, and removed, for scientific purposes, under the rules and regulations of the Secretary of Agriculture: *Provided,* That the rules and regulations of the Secretary of Agriculture, in so far as they affect the method of mailing insects, shall be approved by the Postmaster-General, and nothing in this Act shall be construed to prevent any State from making and enforcing laws in furtherance of the purposes of this Act, prohibiting or regulating the admission into that State of insects from a foreign country.

SEC. 4. That any person, company, or corporation who shall knowingly violate the provisions of section one of this Act shall, for each offense, be fined, upon conviction thereof, not more than five thousand dollars or imprisoned at hard labor not more than five years, or both, at the discretion of the court.

Approved, March 3, 1905.

LIFE HISTORY OF THE GIPSY MOTH.

As the life history of this moth appeared in full in my last report I will only show the egg-cluster, adult caterpillar and female moth, quoting the description from my last report as there are many who did not receive the report of last year who will want to learn of these stages, at least, so as to be able to identify the insect if seen.

There are four distinct stages in the life history of this insect, namely, the egg, larva or caterpillar, pupa and adult or perfect moth. The accompanying cuts are life size.

EGG CLUSTER.

The eggs are deposited in masses of from three to five hundred in a cluster. These are laid during the period from the last of July to the middle of August. The eggs are very small, the cluster (Fig. 12) averaging about an inch in diameter, of irregular outline, flattened and covered with a yellowish, felt-like substance which comes from the body of the female during

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the process of laying the eggs. As the female moth is a very weak flyer, these eggs are not deposited on the leaves as are those of the brown-tail moth, but are placed on the trunks of the trees, on the under side of large limbs, very often hidden away under rocks, brush-piles, fence rails and holes in trees, in fact, in any out-of-the-way place where the moth can crawl in and be unmolested. These eggs do not hatch until the following spring when the leaves are sufficiently developed to furnish food for the young caterpillars.



FIG. 12—Egg Cluster of Gipsy Moth.

LARVA OR CATERPILLAR.

The young caterpillars hatch from the first to the middle of May. They are so small as not to be seen by the casual observer, as they crawl up the trees. They are almost black in color, with very slight bodies about one-eighth of an inch in length, covered with numerous hairs. As they grow they shed their skins, or moult, several times before reaching maturity. In the advance stages, the most of the feeding is done during the night. They reach their full growth from the first to the

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middle of July, depending upon the season. They are then large, robust looking caterpillars (Fig. 13) from 2½ to 3 inches in length, varying in color from a light to a very dark brown.



FIG. 13—Larva or Caterpillar of Gipsy Moth.

There are three light yellow broken lines extending the whole length of the body, one in the center of the back and one each side, with a row of tubercles between. There are six rows of elevated tubercles along the body, each one bearing a tuft of hairs of varying lengths. The first four pairs of tubercles on the third to sixth segments inclusive are of a bluish color, the remaining ones are red. The head is prominent, light yellow, marked with two distinct, almost vertical black dashes, the rest being finely sprinkled with the same color. The long hairs of the second segment project well forward in front of the head.

THE MOTH.

The female (Fig. 14) is very light, almost white in color, with very thin, semi-opaque wings, the fore wings being marked with a row of brown spots along the margin and several irregular wavy lines and spots of the same color over the body of the wing. The hind wings are uniformly light, with a somewhat indistinct, marginal row of brown spots between the veins.



FIG. 14—Female Gipsy Moth.

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The body is unusually large for a moth of the same wing expanse, which accounts for its inability to fly. The end of the body terminates quite abruptly and is covered with light brown or yellowish hairs, which are used in covering the egg clusters. The antemæ of the female are slender, while those of the male are quite broadly feathered, brown in color. Those of the female are black.

Soon after mating, the female moth deposits her egg clusters, as previously described, and then dies. The insect remains in the egg stage about nine months of the year; is active in the caterpillar stage, the only time it is doing damage to vegetation, for about two months. This period is through May and June, the pupa and adult stages lasting the remaining month. These stages may vary to quite an extent, depending upon the season. I have stated about the average time for each.

SCOUTING.

The requirements of a good scout are a well trained eye with keen vision; a deep interest in the work, so that one may not get discouraged if an egg-cluster does not show up just where or when it is expected to; a level head for climbing, and good judgment enough to succeed where others fail. In fact it is rather a difficult task to find many number one scouts. The man of ordinary attainments can not become an expert.

The great secret of success lies in his ability to adapt himself to all of the different circumstances that may be presented. He must be methodical and possess the faculty of thoroughness to a marked degree. In other words such a man is at the top round of the ladder as a specialist.

The process of scouting consists of examining every nook and cranny where a female moth could possibly get in to lay her eggs. The moth much prefers darkness to light, and as a result the eggs are generally deposited in some such place as,—in the crevasses of rough barked trees; on the under side of limbs; in knot holes or hollows in the trunk; in brush heaps; under rails of fences; in stone walls or rock piles; under stones, board walks, or rubbish of any kind; in sheds or other open buildings; in short almost anywhere and everywhere.

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INSPECTORS' EQUIPMENT.

Each field inspector is furnished with a badge which gives him the authority to enter private grounds. (See section 8, Chapter 15 of this act). A field note-book is issued to each man in which is kept a strict daily account of all work done, together with an itemized statement of all expenses incurred for the day. A daily report, made on a blank provided for that purpose, is also filled out at the end of each day's work and sent in to the Special Field Agent. These daily reports are examined by him and a condensed weekly report is made out and forwarded to the office of the State Entomologist at the end of each week. These are examined and placed on file in the office. Each man's expense account is carefully gone over, checked up from each day's report, and approved before it is sent to the State Auditor.

The field force is divided into squads of five or six men each. Each squad is furnished with climbers and a pair of field glasses for spying out the egg-clusters high upon the trunks or in the tops of the trees. The men are also furnished with axes, saws, bush-hooks, rakes, etc.

All infestations found are located by a special mark on the trees (See Plate XVII). These are for guides when the burlap season opens.

When egg-clusters are found they are destroyed by treating them with a mixture containing creosote, which is carried in tin cans and is applied with a brush. The creosote penetrates the egg-cluster and destroys the eggs.

During the past season no spraying has been attempted but this may be resorted to during the coming season. Barrel burning outfits have been used for spraying with oil on low shrubbery and grass as well as into rock heaps and stone walls, where burning had to be resorted to.

BURLAPPING TREES.

The burlap comes in bales cut into strips eight inches wide. These strips are wound into rolls which are carried by being suspended on a stick with a string or strap around the neck as shown in plate XIII. These strips are put around the tree at a convenient height to be easily examined. The strips are cut

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so as to lap slightly and then are fastened in place by a string tied around the center of the burlap. The upper half is then turned down making a double fold. The caterpillars are nocturnal in their habits, feeding by night. While they are small they remain near their feeding ground but as they grow larger they crawl down the tree in order to find a hiding place. On reaching the burlaps they congregate under the folds away from the light. Here they are found and destroyed. This was the principal method employed during the past season and proved eminently satisfactory. Each field man has as many trees as he can conveniently attend to, turning the burlap each day. One can readily see that this is no place for an unscrupulous man. Only strictly reliable men can be employed in such an important work as this.

During the past season two thousand one hundred and twenty-one trees were burlapped in the infested district. Work was begun at Togus on May 13th, where eighty trees were treated. The most of the burlapping was done during the third week in May.

The first gipsy larvæ were taken under the burlap May 31st at York.

The first pupa seen was at Eliot on August 1st.

It often occurs that the caterpillars are found pupating under the burlaps.

SCOUTING DURING THE SEASON.

The first scouting done in the State was in the fall of 1906 when Mr. D. M. Rogers, the National Field Agent, came to Kittery with twelve men for the purpose of covering the principal highways from Kittery to Portland. They were divided into two squads of six men each.

These men had been employed in Massachusetts as special scouts in this work. They did not attempt any woodland scouting for two reasons, one the lack of time and the other that it was thought that the infestation would occur along the main traveled highway and not in the wood lots. Beginning with Kittery the following towns were scouted with egg-clusters as noted:—Kittery, 226 egg-clusters, Eliot 27, York 182, Wells 47, Kennebunk 9, Kennebunkport 3, making a total of 494 new egg-clusters to date and 22 old ones. The scouting was continued to Biddeford, which was reached on January 28, 1907.

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On account of the deep snow, work was abandoned for the time being. In the meantime some of our men who had been employed on the brown-tail work were sent to Massachusetts to learn the business. After being in Mr. Rogers' employ for a sufficient time he returned them to Maine and had them scout the principal cities east of Portland, viz. Ellsworth, Bangor, Waterville, Augusta, Hallowell, Gardiner, Bath, Rockland and Brunswick. At this time work was discontinued on account of snow.

On the 4th of April, 1907 the government scouts again returned and took up the scout at Biddeford where they left off in January, and continued into Portland. They finished work on the 10th of May and returned to Massachusetts. Although very thorough work was done no egg-clusters were found outside of Kennebunkport by the government scouts with the exception of one found at Togus in December.

On April 16th our State men began to rescout the territory gone over by the government men. This was done to guard against the possibility of infestations being left undiscovered as the snow had materially hindered the men from making a satisfactory scout especially in stone walls and around the trunks of trees where the snow was deep.

The new scout proved very successful as many new infestations were found. The towns of Berwick, North Berwick and South Berwick were included in the spring scout, but only one egg-cluster was found in the Berwicks and that was in South Berwick on Academy street. By this scout 432 new egg-clusters were found making a total of 926 up to the first of June.

SCOUTING IN THE FALL OF 1907.

On October 14th Mr. Rogers sent fifteen scouts from Massachusetts. These men were turned over to the State Field Agent and were divided into three squads, each under the charge of one of our field men. At this time we had nine State men in the work.

As soon as the Thaxter infestation was discovered on November 1st arrangements were made with Mr. Rogers to send more men. These men were sent from time to time as they could be secured and others were added from our state until thirty men were on the government pay roll. Of this number nearly one-

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half were Maine men, mostly employed from the towns in the infested district. At the same time our state force was increased to twenty-five men, making fifty-five in all.

COLONY HISTORY.

The following table gives a summary of the number of colonies, number of egg-clusters and their location from the first scout, begun on November 20th, 1906, to the first of January, 1908. During the work of last summer many of these infestations were wiped out as far as any new egg-clusters appeared this fall, but even those will have to be looked after during the coming season to see that no new outbreak occurs.

KITTERY.

Colony No.	Property of	Location	No. of Egg-clusters.
1	Daniel Cook,	Bridge St.	3
2	Allen Jackson,	Bridge St.	1
3	Remick Grove,	Bridge St.	11
4	Ellen Leach,	Newmarch St.	1
5	Waldo Hanscomb,	Newmarch St.	1
6	Chas. Bonnin,	Newmarch St.	1
7	Henry Ham,	Newmarch St.	2
8	Dr. D. O. Junkins,	Newmarch St.	2
9	W. A. Willey,	Newmarch St.	2
10	Asa Wade,	Newmarch St.	1
11	J. H. Foye,	Newmarch St.	1
12	Mrs. S. A. Richardson,	Newmarch St.	1
13	George Manatte,	Government St.	1
14	Judge Neil,	Government St.	1
15	Mrs. H. Wentworth,	Government St.	5
16	John Pedigrew Estate,	Government St.	2
17	Edward Wilcox,	Government St.	1
18	George Gibbons,	Love Lane	1
19	W. G. Swett,	Love Lane	1
20	J. H. Gerry,	Love Lane	1
21	J. W. Greve,	Love Lane	1
22	W. A. Williams,	Love Lane	1
23	A. S. McIntire,	Love Lane	4
24	U. S. Navy Yard		54
25	Mrs. A. W. Johnson,	Rogers Road	1
26	R. R. Fernald,	Rogers Road	2
27	A. R. Dinsmore,	Rogers Road	1
28	Augustus Stevens,	Rogers Road	1
29	Hiram Keene,	Rogers Road	1
30	Horace Moore,	Rogers Road	1

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Colony No.	Property of Location	No. of Egg-clusters.
31	O. P. Remick, Rogers Road	1
32	Luther Goodsoe, Rogers Road	1
33	J. P. Rogers, Rogers Road	13
34	M. N. Uram, Rogers Road	5
35	J. H. Swett, Rogers Road	10
36	Albert Manson, Rogers Road	2
37	John Collins, Rogers Road	1
38	J. R. Philbrick, Kittery Point Road	3
39	Mrs. A. Remick, Kittery Point Road	1
40	Christopher Remick, Kittery Point Road	6
41	Fernald Grove, Locke's Cove	25
42	Frank Remick, Kittery Point Road	1
43	H. A. Bryant, Kittery Point Road	1
44	Joseph Keene, Kittery Point Road	2
45	W. F. Pinkham, Kittery Point Road	2
46	J. H. Locke, Kittery Point Road	3
47	G. B. Blomberg, Kittery Point Road	1
48	W. H. Pierce, Kittery Point Road	1
49	D. C. Seaward, Kittery Point Road	4
50	F. H. Goss, Kittery Point Road	1
51	Jamaica Island, Willow trees	40
52	Florence Cleaves, Kittery Point Road	2
53	Mrs. Clarke, Pepperell Road	1
54	Follett Gerrish, Pepperell Road	1
55	Horace Mitchell, Pepperell Road	3
56	Stephen Decatur, Pepperell Road	2
57	Piscataqua Yacht Club, Pepperell Road	1
58	Barret Lewis, Pepperell Road	1
59	J. C. Rudge, Pepperell Road	1
60	Tree in highway, Cor. Hoyt Ave.	1
61	Jane N. Patch, Pepperell St.	1
62	Fred Rollins, Pepperell St.	1
63	C. W. Frisbee, Pepperell St.	1
64	Mary J. West, Pepperell St.	1
65	G. W. Blaisdell, Pepperell St.	1
66	Eunice Safford, Pepperell St.	1
67	Thomas Bray, Pepperell St.	5
68	M. B. Williams, Pepperell St.	5
69	Mary E. Bray, Pepperell St.	1
70	Wesley Raines, Pepperell St.	1
71	J. A. Phillips, Pepperell St.	1
72	J. G. Irish, Pepperell Road	64
73	Col. Highbee, Pepperell Road	3
74	W. C. Call, Pepperell Road	2
75	Manning Phillips, Pepperell Road	1
76	Chas. Sawyer, Pepperell Road	1
77	D. O. Seaward, Pepperell Road	4

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Colony No.	Property of Location	No. of Egg-clusters.
78	Ann Drew, Pepperell Road	2
79	John E. Tobey, Pepperell Road	1
80	Chas. M. Todd, Pepperell Road	21
81	Melvin Blake, Pepperell Road	6
82	E. W. Hoyt, Pepperell Road	39
83	D. O. Seaward, Haley Road	1
84	Noah E. Emery, Haley Road	1
85	G. A. Lambert, Haley Road	1
86	Horace Mitchell, Haley Road	4
87	H. C. Call, Haley Road	1
88	J. Fletcher, Haley Road	1
89	Samuel Moulton, Haley Road	1
90	Calvin Lewis, Haley Road	2
91	Mrs. J. Wilson, Haley Road	1
92	W. H. Wilson, Haley Road	5
93	W. R. Parker, Haley Road	9
94	Lafayette Frisbee, Haley Road	1
95	Wm. Goodwin, Gerrish Island	29
96	S. E. Jennison, Gerrish Island	80
97	Woodland, owner not known, Gerrish Island	2
98	J. H. Seaward, Brave Boat Harbor Rd.	5
99	M. P. Randall, Brave Boat Harbor Rd.	3
100	John Amee, Brave Boat Harbor Rd.	3
101	Mrs. J. A. Pruitt, Brave Boat Harbor Rd.	134
102	Chas. Call, Brave Boat Harbor Rd.	1
103	John Thaxter, Brave Boat Harbor Rd.	3356
104	Daniel Bedell, Brave Boat Harbor Rd.	9
105	Elmer Riley, Brave Boat Harbor Rd.	172
106	Daniel F. Raines, Brave Boat Harbor Rd.	183
107	William Hutchins, Brave Boat Harbor Rd.	24
108	T. Keene, Brave Boat Harbor Rd.	111
109	John Call, Brave Boat Harbor Rd.	186
110	M. E. Riley, Brave Boat Harbor Rd.	5
111	G. W. Muchemore, Post Road	1
112	E. W. Furbush, Post Road	2
113	L. E. Farrish, Post Road	6
114	J. Gerry, Post Road	1
115	Henry Tucker, Post Road	1
116	O. P. Remick, Post Road	1
117	A. W. Sterling, Post Road	8
118	W. F. Carr, Post Road	2
119	John Wentworth, Post Road	3
120	Edward Moulton, Post Road	1
121	Aug. Stevenson, Post Road	3
122	T. J. Pedigrew, Post Road	1
123	O. E. Pedigrew, Post Road	2
124	N. H. Haley, Post Road	1

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Colony No.	Property of	Location	No. of Egg-clusters.
125	John Wentworth,	Post Road	7
126	E. P. Cole,	Post Road	1
127	George Leach,	Post Road	1
128	J. E. Moore,	Dennett Road	1
129	Henry Marden,	Dennett Road	1
130	T. D. Kenney,	Fernald Road	43
131	Annie Foss,	Fernald Road	1
132	Frank Bartlett,	Fernald Road	1
133	Frank Haley,	Wilson Road	3
134	H. H. Cook,	Wilson Road	5
135	Fred E. Cooper,	Wilson Road	2
136	S. E. Caswell,	Picot Road	1
137	John Gunnison,	Picot Road	31
138	Mark Butler,	Hanscomb Road	1
139	W. E. Mugridge,	Norton Road	1
140	E. R. Fuller,	Norton Road	6
141	E. D. Manson,	Bartlett Road	1
142	Frank Fuller,	Bartlett Road	48
143	George Hill,	Bartlett Road	44
144	William Hutchins,	Bartlett Road	2
145	Charles Hill,	Carters Lane	15
146	Ivory Lewis,	Adams Road	1
147	G. P. Welch,	Adams Road	35
148	E. A. Thomas,	Adams Road	1
149	R. B. Adams,	Adams Road	1
150	Cyrus Fernald,	Cutts Road	4
151	C. H. Spinney,	Cutts Road	3
152	George B. Libby,	Cutts Road	3
Total Egg-clusters found in Kittery to Jan. 1, 1908..			5035

ELIOT.

1	Henry Spinney,	Pleasant St.	1
2	Ernest Cole,	Cross St., South Eliot	2
3	W. Linwood Fernald,	State Road	1
4	M. P. Tobey,	Mast Cove Road	6
5	Everett Hammond,	State Road	1
6	George Nason,	State Road	1
7	F. S. Nelson,	Old Road	1
8	F. E. Kimball,	Old Road	1
9	John Rogers,	River Road	1
10	Walter Rowe,	State Road	1
11	Martin Shapleigh,	Shapleigh Road	1
12	Jasper Shapleigh,	Shapleigh Road	1
13	Everett Shorey,	Depot Road	2
14	S. Carter,	Hanscome Road	1
15	G. W. Noyes,	Beach Road	1

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Colony No.	Property of Location	No. of Egg-clusters.
16	Sarah Farmer, Moses Paul, Rosemary	3
17	N. Parker, Brixham Road	1
18	John Stacey, Dover Road	1
19	N. Frost, Dover Road	1
20	C. E. Frost, Dover Road	2
21	F. E. Wooster, Dover Road	3
22	D. W. Furbish, Dover Road	1
23	Simon Emery, Hanscome Road	1
24	Moses Goodwin, Goodwin Road	1
25	A. Dixon, Maple Ave.	2
26	George Athorne, Water Front, South Eliot	1
27	Nathan Spinney, Water Front, South Eliot	2
28	E. Cole, Water Front, South Eliot	1
29	R. Staples, Water Front, South Eliot	1
30	Rose Spinney, Pleasant St.	1
31	T. Knight, Pleasant St.	1
32	W. Dame, Pleasant St.	8
33	Dr. Willis, Between Main and Pleasant	2
34	Charles Paul, Pleasant St.	1
35	George Paul, Pleasant St.	1
36	Adaline Paul, Pleasant St.	1
37	William Huntress, Pleasant St.	1
38	Ernest Cole, Cross St.	1
39	Francis Dixon, Maple Ave.	1
40	Charles Dixon, Pleasant St.	2
41	Timothy Manson, Pleasant St.	1
42	William Lydston, Pleasant St.	1
43	Erwin Tobey, Pleasant St.	2
44	Chester Spinney, Pleasant St.	1
45	Mrs. E. Dixon, Mast Cove Road	1
46	Fred S. Bunker, Mast Cove Road	1
47	Samuel Arlington, Mast Cove Road	2
48	George Spinney, Pleasant St.	2
49	Layton Place, River Road	1
50	E. H. Plaisted, Old Road	2
51	Ellen Rowe, River Road	3
52	Charles Decoff, River Road	1
53	A. W. Tucker, River Road	4
54	Frank Kennard, Old Road	2
55	Martin Shapleigh, Old Road	1
56	L. J. Emery, Old Road	1
57	C. C. Jellison, Old Road	1
58	Fred Nelson, Old Road	1
59	J. Rand, Old Road	4
60	Sander Liebman, State Road	2
61	Sarah Farmer, Farmer Road	2
62	Highway, State Road, near Hammonds	1

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Colony No.	Property of Location	No. of Egg-clusters.
63	A. Hill, State Road	1
64	Sarah Remick, State Road	1
65	John Greenough, Hanscome Road	3
66	A. M. Perry, Beach Road	1
67	George Webber, Beach Road	1
68	W. J. Bartlett, Depot Road	2
69	C. E. Bartlett, Depot Road	3
70	Millard Goodwin, Goodwin Road	1
71	J. H. Butler, Beach Road	1
72	Charles Gale, Wooster Road	37
73	Mrs. O. H. Wooster, Wooster Road	3
74	Nancy Cutler, Brixham Road	1
75	J. Goodrich, Goodwin Road	1
76	Edwin Cook, Cooks Crossing	1
77	H. C. Orr, Goodwin Road	3
78	D. T. McAllister, Goodwin Road	1
79	George Frost, Brixham Road	2
80	S. S. Simpson, Brixham Road	1
Total Egg-clusters found in Eliot to Jan. 1, 1908		164

YORK.

1	A. B. Junkins, Main Road, Scotland	1
2	J. P. Bragdon, Main Road, Scotland	1
3	Benjamin Hill, Scituate Road	1
4	Austin Trefethen, South Side Road	1
5	Edwin Moulton, South Side Road	2
6	O. F. Auldis, South Side Road	2
7	A. W. Randall, Lane off Bartlett Rd	23
8	E. Lee, Kittery Road	1
9	E. L. Gifford, Godfrey Cove Road	1
10	Frank Mozart, Lindsay Road	1
11	S. A. Bragdon, Lindsay Road	1
12	S. S. Allen, Western Point Road	10
13	Fred Baker, Golf Street	1
14	C. H. Bragdon, Golf Street	1
15	S. W. Junkins, Post Road, York Corner	15
16	C. H. Bragdon, Post Road, York Corner	1
17	S. A. Preble, Post Road, York Corner	5
18	John Glenn, York Harbor	49
19	W. G. Varrell, York Harbor	1
20	Mrs. J. Banks, Beach Road	1
21	G. B. Preble, Beach Road	7
22	Edwin Norton, Cape Neddick	40
23	Thompson, Tapley, Seavey, Post Road	200
24	Mrs. Brewster, New Bridge Road	1
25	D. S. Donnell, Cape Neddick	69

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Colony No.	Property of Location	No. of Egg-clusters.
26	D. S. Safford, Cape Neddick	6
27	D. S. Farwell, Agamenticus Road	15
28	C. H. Weare, Post Road	7
29	Benjamin Kimball, Barrows Road	7
30	Plaisted Bros., Post Road, York Corner	7
31	J. P. Preble, Brixham Road	1
32	Joseph Shaw, Berwich Road	1
33	Anson Shaw, Portsmouth & Berwick Road	1
34	Alva Trafton, Agamenticus Road	1
35	T. H. Shaw, Chase Pond Road	1
36	D. C. Goodwin, Logging Road	10
37	Samuel Hutchings, Pine Hill Road	1
38	Mary Cole, Pine Hill Road	1
39	C. W. Walker, York St., York Village	2
40	J. W. Bragdon, York St., York Village	3
41	John Hutchings, York St., York Village	1
42	C. H. Bragdon, Golf St., York Village	2
43	E. H. Todd, Cape Neddick	2
44	Albert Stovers, Cape Neddick	2
45	D. L. Safford, Cape Neddick	1
46	George Proctor, Old Logging Road	1
47	E. C. Moody, Back Road	1
48	Andrew Webber, Back Road	1
49	David Donald, Back Road	1
50	Harry Norton, Back Road	2
51	C. H. Farley, Shore Road	5
52	W. G. Moulton, Kittery Road	1
53	Barrell farm, Beach Ridge Road	5
54	D. Blaisdell, Beach Ridge Road	1
55	Abel Grover, Beach Ridge Road	2
56	Charles Grover, Beach Ridge Road	1
57	Joseph Moulton, Cider Hill Road	1
58	J. P. Bragdon, Cider Hill Road	1
59	George McIntire, New Scotland Road	1
60	G. E. Moulton, Cider Hill Road	2
61	Charles Young, Cider Hill Road	2
62	W. G. Moulton, Cider Hill Road	1
63	Charles Young (2nd place), Cider Hill Road	1
64	David Young, Cider Hill Road	2
65	D. A. Stevens, Tree in street, York Vil.	1
66	S. W. Junkins, Lindsay Road	1
67	Edwin Baker, Lindsay Road	1
68	Fred Baker, Golf St.	1
69	E. Moulton, South Side Road	1
70	Abbie Langell, Kittery Point Road	1
71	Fred Langell, Kittery Point Road	1
72	S. S. Allen, Raynes Neck	3

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Colony No.	Property of Location	No. of Egg-clusters.
73	Fred Moore, Kittery Point Road	8
74	E. L. Gifford, Godfrey Cove Road	2
75	G. W. Raynes, Raynes Neck	6
76	Benjamin Lucas, Raynes Neck	6
77	Samuel Moore, Kittery Point Road	8
78	Malcolm Paine, Raynes Neck	52
79	George Raynes, Woods, Raynes Neck	40
80	G. F. Austin, Raynes Neck	8
81	Prof. Ames, Godfrey Cove Road	54
82	Mrs. P. Perkins, Raynes Neck Road	3
Total Egg-clusters found in York to Jan. 1, 1908		737

WELLS.

1	Franklin Kimball, Gray's Lower Road	1
2	William E. Littlefield, Old Post Road	1
3	John W. Davis, Beach Road	18
4	James Tibbetts, Old Stage Road	2
5	A. B. Maxwell, Old Post Road	29
6	D. W. Perkins, Old Post Road	1
7	M. L. Staples, Bald Head Road	1
8	C. M. Burns, Bald Head Road	1
9	T. H. Phillips, Post Road	1
10	Oren Littlefield, Shore Road	2
11	Nahum Boston, North Village Road	1
12	A. E. Boston, North Village Road	34
13	B. H. Hilton, North Berwick Road	1
14	Harry Hilton, North Berwick Road	1
15	Eben Gray, Gray's Corner	1
16	S. M. Reynolds, Pine Hill Road	1
17	J. O. Davis, Swamp Road	1
18	Mrs. Sarah Ricker, Swamp Road	1
Total Egg-clusters found in Wells to Jan. 1, 1908		98

KENNEBUNKPORT.

1	Lorenzo Tarbox, Post Road	1
2	Mrs. Mary Woodman, Post Road	3
Total Egg-clusters found in Kennebunkport to Jan. 1, 1908		4

KENNEBUNK.

1	J. W. Lake, Back Road	3
2	Mrs. S. Abbott, Back Road	1
3	Mrs. Mary A. Peabody, Back Road	8
4	S. A. Perkins, West Kennebunk	1
Total Egg-clusters found in Kennebunk to Jan. 1, 1908		13

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SOUTH BERWICK.

Colony No.	Property of Location	No. of Egg-clusters.
1	Tree in highway, Academy St.	1
2	Mrs. E. Flynn, Dover Road	1
3	David Hallowell, Branch Road	1
	Total Egg-clusters found in South Berwick to Jan. 1, 1908	3

NORTH BERWICK.

1	J. L. Guptill, South Berwick Road	1
2	S. Hall, Beech Ridge Road	1
3	J. Hall, Front Beech Ridge Road	3
	Total Egg-clusters found in North Berwick to Jan. 1, 1908	5

BERWICK.

1	C. H. Coffin, Cranberry Meadow Road	1
2	J. H. Fogg, Sullivan St.	1
3	L. Emery, Post Road	1
	Total Egg-clusters found in Berwick to Jan. 1, 1908	3

TOGUS.

1	Soldiers Home, Togus	40

TOTALS.

Kittery	5035
York	737
Eliot	164
Wells	98
Kennebunkport	4
Kennebunk	13
South Berwick	3
North Berwick	5
Berwick	3
Togus	40
Total Egg-clusters found in the state from Nov. 20, 1906 to Jan. 1, 1908	6102

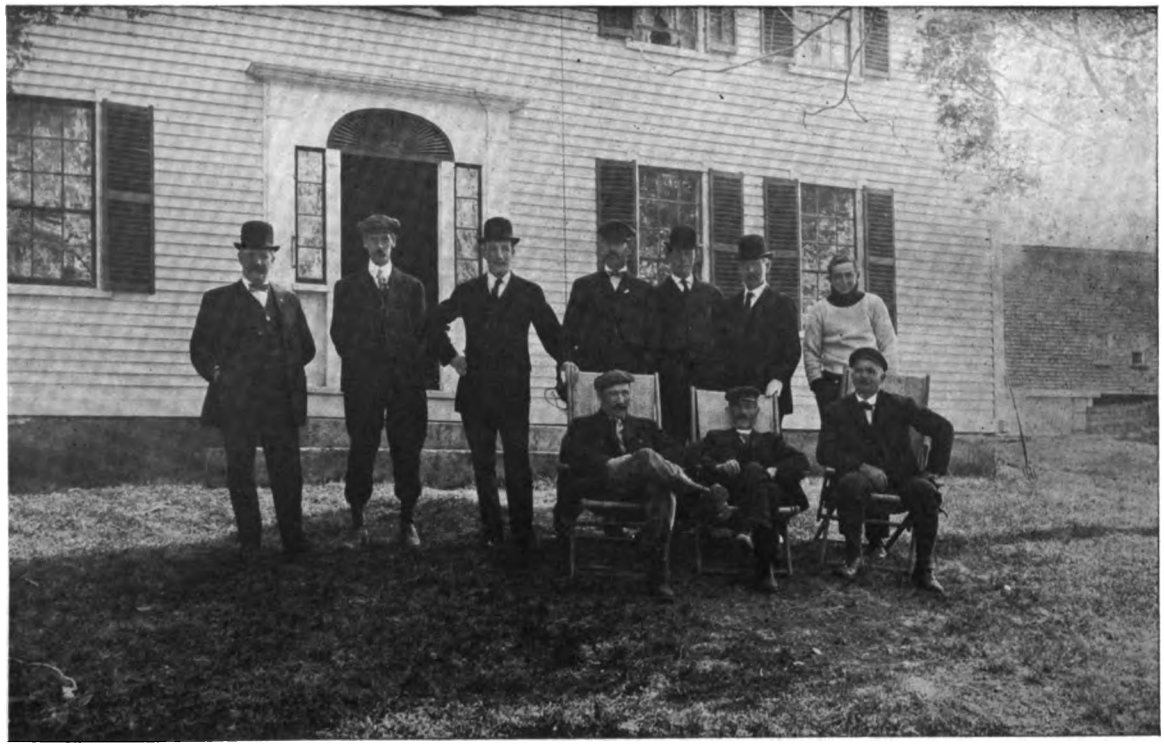
WORK IN ELIOT.

The fall scout of 1906 and that of the spring of 1907 up to June 1st gave the town of Eliot twenty-five infestations numbering forty-seven egg-clusters. With but few exceptions these were single infestations, only one egg-cluster occurring in a place as shown in the colony history, page 239.

The largest of these, (colony number 4) was that on the estate of Mr. M. P. Tobey, on Mast Cove Road at Tobey's

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MAINE FARMER PRESS, AUGUSTA

Original crew of Gipsy Moth hunters in the State of Maine. June 1907

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Corner. Six egg-clusters were found here in some apple trees situated near the electric road which passes along the highway. This infestation received the same care during the summer as did all of the others. Nothing was found here during the scout this fall. The orchard has been thoroughly scraped, trimmed, and tinned in preparation for another season.

The following letter to the Department from Mr. Tobey is very gratifying.

"Eliot, York Co., Maine, Oct. 4th, 1907.

My Dear Sir:—As a citizen of Eliot and a lover of this beautiful "Pine Tree State" I take it upon myself to personally thank you and your co-workers for the noble effort which you have made, and are continuing to make, to protect and save our splendid forests from the plague which threatens to destroy them.

In this great service you merit, not only the permanent gratitude of the people of Maine, but also that of the people of the United States. I feel that much credit is due to the efficiency and faithfulness of your field force and congratulate you, upon having secured such men to assist you in carrying forward this great work.

I take much pleasure in expressing to you my warmest thanks, and my deep gratitude, and with a strong hope that every success may crown your efforts, I am, with cordial regards,

Very sincerely yours,
M. P. TOBEY."

One peculiarity of the other infestations in Eliot is that every road in town has one or more infestations. This would indicate that the caterpillars were carried there by teams or automobiles from Kittery or Portsmouth, or perhaps farther yet. Many people come each year from Massachusetts to spend the summer here. Some of the infestations may have been caused by the birds. Of the twenty-five infestations treated during the summer only one showed any infestation this fall.

THE FALL SCOUT IN ELIOT.

The worst colony in Eliot was found on what is called the Gale place on the Wooster road. This place is rented to other parties. Mr. Gale's place where he lives has no infestation. On November 1st thirty-seven egg-clusters were found in the orchard. The most of these were taken from one old apple tree. This place is away from the main traveled road also some distance from the electric road. These people visit in Massachusetts and also have friends from there which may account

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for the presence of the pest here. This territory has been thoroughly gone over and the trees will be burlapped as the probabilities are that this is an infestation of several years' standing and probably other egg-clusters are secreted in out-of-the-way places.

A total of eighty infestations and one hundred and sixty-four egg-clusters were found up to January 1st, the largest being the above named Gale place.

WORK IN WELLS.

In the town of Wells only five infestations were found up to June 1st, 1907. These were all carefully burlapped and watched. The worst one was that of A. B. Maxwell on the old post road at Ogunquit. Twenty-nine egg-clusters were found in the orchard which is back of, and close to the house. Summer boarders are here each season; many of them come from Massachusetts. About twenty trees were burlapped and many larvæ were taken. No egg-clusters were found this fall during the cleaning process.

In the John W. Davis orchard on the Beach road, a short distance from the old post road, eighteen egg-clusters were taken. The place was burlapped and carefully tended but nothing has been found.

FALL SCOUT.

Thirteen new infestations were found this fall making eighteen in all to date. The worst of these was that on the estate of A. E. Boston on the North Village road, where thirty-four egg-clusters were found. The scout at this place is not complete. The clusters were found in apple trees, on shade trees and in a stone wall near the house. This is near a thickly wooded section and will call for a new scout in the spring on account of the snow that hinders the work at the present time.

The rest of the infestations in town consist mainly of single egg-clusters.

KITTERY.

A small infestation was found on the place of Frank Fuller on the Bartlett road, where a few egg-clusters were taken. During the summer while attending burlaps a number of caterpillars were discovered on a large willow tree some twenty yards distant from where the trees were being cared for.

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G. P. Welch place

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Later, August 26, while attending burlaps two female pupæ were found and twelve new egg-clusters. Nine female moths were seen laying their eggs. On August 27th two inspectors visited this place and discovered twenty-one new egg-clusters and also seven female pupæ. The next day the same men found twenty more egg-clusters, two female moths and three female pupæ. The willow was overhanging the street and was considered such a menace to the spread of the pest that it was cut down and the surrounding territory thoroughly cleaned up.

On November 18th a bad infestation was found on some willow trees on Jamaica Island where forty egg-clusters were taken. This was the property of Dr. Van Renseller of Washington, D. C.

November 22nd, 1906, an infestation consisting of three egg-clusters was discovered in Kittery navy yard. They were found on a tree just back of the hospital. These trees were cared for during the summer.

This fall on November 23, while scouting the yard, three new infestations were found numbering fifty-one egg-clusters; one south of the hospital; one near the naval construction building and one on willows near Wyman's Point.

These infestations together with Jamaica Island will keep one man busy during the coming summer.

SOUTH BERWICK.

In the spring scout one egg-cluster was found in the town. It was on a shade tree on Academy street. Nothing showed up here during the summer. The scout this fall gave two more infestations, one on the Dover Road near Eliot and the other on Branch Road near the Wells line. Both were on orchard trees and were old egg-clusters, thus showing that they were laid by single virgin moths.

NORTH BERWICK.

Nothing was found here in the spring but the fall scout gave three infestations containing five egg-clusters. One was on the South Berwick road and two on the Beach Ridge road.

These are located near the main traveled road and may have been brought from Wells or Eliot, or possibly from Kittery.

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BERWICK.

The town of Berwick was thoroughly scouted in the fall and three infestations were found, a single egg-cluster in each. One was on Cranberry Meadow road, one on Sullivan street and one on the Post road. All were on apple trees. Nothing was found here in the spring.

KENNEBUNK.

At Kennebunk in the spring of 1907 four new infestations were found, the worst being on the estate of Mrs. Mary A. Peabody on the Back road. Eight egg-clusters were found, twenty trees were burlapped in the orchard, some larvæ were taken.

KENNEBUNKPORT.

In Kennebunkport two infestations were found containing four egg-clusters. Quite a number of larvæ were taken in the orchard of Lorenzo Tarbox on the Post road.

No fall scout has been made in these towns as yet but they will be thoroughly gone over before the burlapping season of 1908.

AT TOGUS.

May 18th eighty trees were burlapped but as only one egg-cluster was found by the scouts it was thought that perhaps it was not fertile. As the men were all very busy in York county no inspection was made until July 17th when the trees were thoroughly gone over, the burlaps were turned and some new scouting was done. At this time forty-two larvæ were taken also three egg-clusters and two partial egg-clusters were found together with four female and three male pupa cases. These were not on the tree where the original infestation was found. After this the infestations were attended to until August 12th with the following results. Three more old pupa cases were found and four old egg-clusters, one hundred and nine larvæ were taken and two hundred and seventy-five pupæ. The last larva was taken August 12th.

August 22nd six new egg-clusters were taken. August 30th three new egg-clusters, six female and two male moths were taken.

October 16th a scout was made which resulted in the finding of seven egg-clusters, and on October 30th a final scout revealed twenty-three new egg-clusters.

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The situation looks rather serious but knowing it as we do there is no question but that it will be under control during the coming season.

This is the only isolated colony outside of York county and every precaution will be taken next summer to wipe out the pest in this locality.

DESCRIPTION OF CUTS.

Plate I (Frontispiece) shows the location of the first gipsy moth infestation found in the State. It was discovered by the Government scouts on November 20th, '06. The infestation is located on Newmarch street in the town of Kittery, near the ferry which crosses to Portsmouth, N. H. A single egg-cluster was found on an apple tree in the orchard just back of the house, about two hundred yards from the street. This street is a short one leading off from the main highway. The electric car track extends to the ferry on this street but no autos and but few teams pass by the spot, so that the moth could not have come in that way, but might have been brought across the ferry from Portsmouth by some means. The scouting was done here when the snow was on the ground and only two egg-clusters were found, the one above mentioned and another just across the street in an orchard similarly situated in the rear of the house. This same territory was again thoroughly scouted over after the snow had gone in the spring of 1907 but no new egg-clusters were found. During the summer the trees about these two infestations were burlapped and carefully watched but no caterpillars were found during the season.

Plate VIII shows a cut of the men employed by the State during the summer of 1907 including the State Field Agent. These men are all in the work at the present time with one exception.

Plate IX is the G. P. Welch place on the Adams road in Kittery. On April 30th thirty-five egg-clusters were found here by the State field force, twenty-one being taken from under the tin roof of the leanto as shown in the cut. The tree running up through the roof gave a suspicious look to the situation and thus led to the discovery of the clusters under the tin. The tin was removed and then replaced after it had been thoroughly inspected. Under this leanto was an old sleigh on the under side of which was found the remains of two egg-clusters, the eggs of which had been scattered broadcast through the town

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during the previous winter. Probably many of these scattered eggs are responsible for the large number of single infestations through the towns of Kittery and Eliot.

In the work in Massachusetts during the old commission an experiment was tried to determine the vitality of the gipsy eggs when subjected to the process of freezing and thawing. Egg-clusters were placed in water and put through this process for several successive periods and quite a per cent of them hatched, showing that the ordinary freezing and thawing does not destroy their vitality.

Fifteen trees in the orchard were burlapped during the summer. The burlaps were carefully tended and every precaution taken to get rid of the pest. A few larvæ were taken which probably hatched from scattered eggs. From the results shown it appeared that the scouts were successful in finding all of the egg-clusters. This place is situated away from the main traveled road. After the burlapping season was over the place was thoroughly cleaned up; the leanto was removed and all trees pruned, scraped and tin-patched so that everything around the place is in first class condition for next summer's work. A few egg-clusters were found during the fall scout in an orchard back of the house but not near enough to have been associated with this infestation.

Plate X. This represents the Capt. Glenn place at York Harbor. The infestation was discovered by the government scouts in November, 1906. Thirty-six egg-clusters were found; some in apple trees; under walks; in decorative rock piles; about the lawn used for summer flower gardens; etc.

This is a summer hotel situated on the main traveled road just opposite the post office at York Harbor. Here hundreds of autos pass by daily during the entire summer. They begin early in May so they would be coming during the whole caterpillar season.

In April this same place was thoroughly scouted by the State men and sixteen more egg-clusters were found, making fifty-two in all. Four were under a plank walk; four in a rock pile; four in a coal shed; one in a box; one in an apple tree; one on the under side of a wash-bench, and one on a piece of plate glass which was standing against the side of the shed. On opening the door of the coal shed a cluster was found on the inside so

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Capt. Glenn place at York Harbor

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that the coal, several tons in all, was shoveled out and three more were found around the sides near the bottom of the bin. This gives one some idea of the qualifications of a first class scout; it shows that he must stick to the job if he would be successful, and not leave one stone unturned in his effort to secure the last egg-cluster.

During the summer all trees near the infestation were burlapped and quite a number of caterpillars were destroyed. In August a few stray moths were seen depositing their eggs. The place was thoroughly gone over this fall; all trees cleaned up and put in first class shape. No further trouble is looked for here as no new egg-clusters were found, but the place will be burlapped and carefully watched during next season.

Plate XI. The D. L. Donnell place at Cape Neddick, York. This house is on the corner of the main road from York Beach and the old post road to Wells. The infestation was found by the State scouts on May 3rd and consisted of fifty-seven nests, one on a tin can, two on an oak tree and the rest in the stone wall shown in the cut. One was an old egg-cluster which indicated that the infestation was at least a year old if not more. About sixty feet of the wall was taken down and every stone thoroughly examined. This place was watched very carefully during the summer by one of the field force and hundreds of the caterpillars were destroyed.

So well was the work done here during the summer that the scout this fall, which was very thorough, did not reveal anything new. This shows that thorough *work can be done* on the extermination question. This place has been thoroughly gone over this fall, all trees have been cleaned and everything is in readiness for another season's work. Despite the fact that this work seems finished another scout will be made as soon as the snow disappears in the spring and all such places will be carefully watched during the coming season.

Plate XII shows a nearer view of the same wall which brings out the individual egg-clusters, the one on the tin can and the eleven on one rock as shown in the cut. The oak tree above mentioned is also shown.

On June 29th one of the inspectors, while engaged in brown-tail work, discovered a gipsy caterpillar in a stone wall on the estate of John Thaxter. On further inspection the wall was

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found to be full of them. After consulting with the owner it was thought best to cut the bushes along the wall. After this was done the whole was sprayed over with oil and burned. Over a thousand caterpillars were thus destroyed. This was the first experiment where burning with oil was used and it proved very effective. The trees in the immediate vicinity were afterwards burlapped and during the season hundreds of caterpillars were taken in this manner.

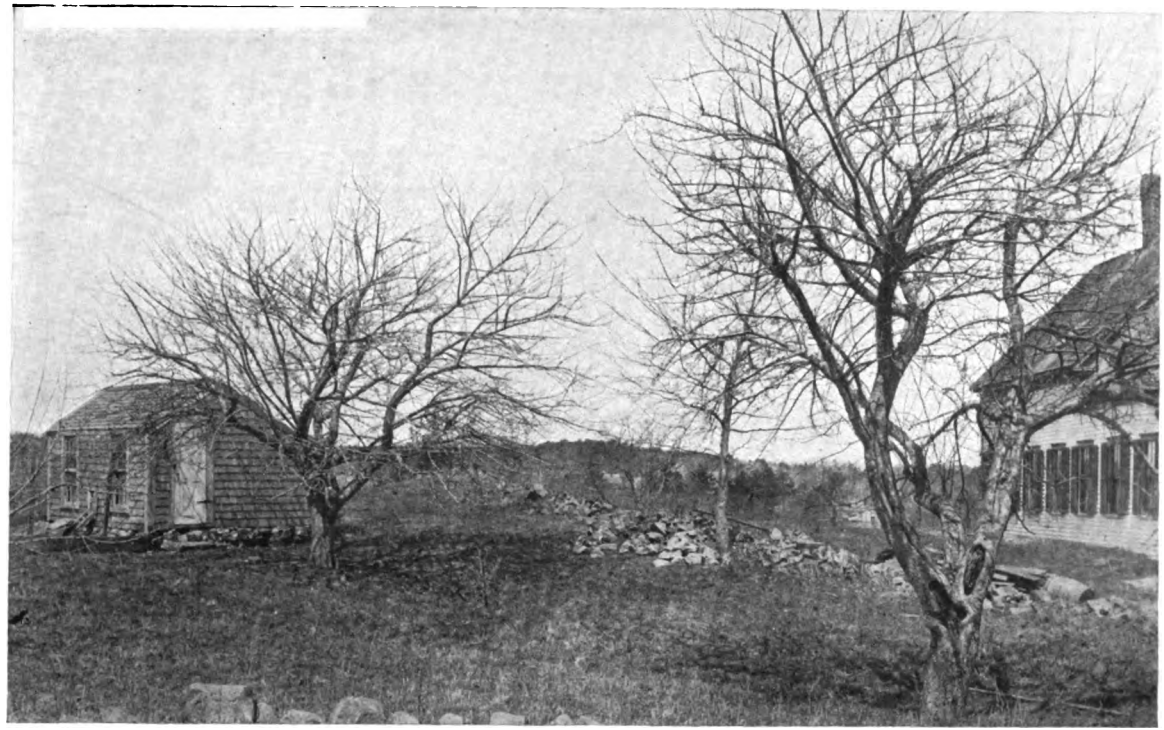
On October 15th a scout was made of this infestation which gave the following results;—on an old oak tree growing in the infested wall four new and sixteen old egg-clusters were taken. This tree was covered with rough bark and offered a good hiding place for the caterpillars so they did not get down to the burlaps and pupated on the trunk. The females on hatching laid their eggs where they were. This tree was cut down and burned. All of the bushes in the section were cut and a number of hickory trees, which were covered with rough bark, were scraped and the whole place has been put in shape to be successfully handled during another season.

After finishing here the scouts went to an adjoining wood lot owned by the same party where many hundreds of egg-clusters were found. Practically all of the wooded section and orchard trees of Cutts Island are infested.

On Saturday, July 13,.one of the men on his way from York Corner to Wells discovered some caterpillars crawling in the road. They proved to be gipsies. They were on what is called the Thompson place situated on the old post road from York to Wells about four miles from York Harbor. On examination he found that both sides of the road for a distance of over a hundred yards were thickly infested with the almost full grown caterpillars. The land adjoining on either side was used for a pasture and had grown up to sweet fern, bayberry bushes and low ground juniper. The place had not been scouted as there were no trees near to indicate that the caterpillars had been there. Stone walls extended along each side of the road and the pasture contained numerous rock piles and loose boulders, making ideal hiding places for the pests.

The caterpillars were found everywhere, in bushes, stone walls, grass, rock piles, etc. The ground was literally covered with the nearly fully developed larvæ. Word was at once sent

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The D. L. Donnell infestation at Cape Neddick

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to the field agent and as soon as possible the whole field force was at work on this new infestation. The bushes were cut and the whole infested section, covering about five acres, was sprayed with oil and burned over, destroying as near as could be estimated, about three-fourths of a million of caterpillars. In a large rock pile in the pasture near the road was found the old infestation.

Two hundred old egg-clusters were found in this one pile of rocks. This one infestation was evidently the source of all the infestations at Cape Neddick.

At first no one seemed to know anything about its origin, but during the same day, as the burning was in progress, a young lad shouted, "Here comes the Gipsies!" and sure enough, a band of perhaps twelve teams of wandering gipsies numbering thirty-five people drove into the pasture near by and went into camp. On enquiring it was found that this same party had been in the habit of coming here for a number of years to camp out during the summer. They came from a thickly infested section of Massachusetts, so that it was very evident where this colony originated. From evidence shown this colony must have started at least five years ago. The few remaining trees were burlapped and the whole surrounding section carefully watched during the remainder of the season. A thorough scout was made this fall by the best experts that could be found and but a single egg-cluster was discovered, and this was found on a rock in the bottom of a pile on the opposite side of the road from the main infestation. This was probably a cluster laid by a moth the caterpillar of which had succeeded in crawling away from the heat of the fire.

This land was used by several parties from different sections of the Cape for pasturing their cows. These animals were driven home each night and it would have been an easy matter for the young larvæ to have secreted themselves in the hair of the animals and been scattered about the town.

The handling of this colony shows what can be done in the line of extermination. This is the most remarkable instance in the work of the season. The destruction of this one infestation saved the State many thousands of dollars.

From the colony history it will be seen that a number of single infestations occurred where but one egg-cluster was

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found. This could hardly be explained in any other way than that the birds were quite active agents in the spreading of these pests. From evidence obtained it seems as if this was the case. Another cause may have been that of the remains of the two found on the bottom of the old sleigh at the Welch place. These eggs were evidently scattered all over town and it would have been an easy matter for these to have hatched, although they might have been subjected to the freezing and thawing process above mentioned. Birds could readily scatter them by carrying the young larvæ on their feet and legs; this fact was established without a doubt during the "Old Commission in Massachusetts."

Plate XIII. This cut shows the manner of burlapping explained on page 303.

A bale of burlap will handle, on the average, about nine hundred trees. Judging from the present outlook at least 30,000 trees will have to be treated during the season of 1908. At least 90% of the infestations burlapped during the past season are free from the pest; in other words the work done was so thoroughly done that not an egg-cluster showed up this fall, with but few exceptions, and even then there was a sufficient reason for it.

Only one egg-cluster was taken in Eliot this fall from the infestation of last summer and that one was back in an orchard away from the trees burlapped.

In Wells, Kennebunk and Kennebunkport nothing showed up near the burlaps.

YORK.

On November 30th a scout was made of the property owned by the following parties:—Malcom Paine, G. F. Austin and George Raynes on Raynes' Neck, and the summer place of Prof. Ames of Harvard situated by the Godfrey Cave road directly back and adjoining the estates of the above named parties. These places were found to be badly infested. They are situated directly across the river from the Thaxter infestation in Kittery, and the caterpillars were probably carried across by the tide on drift wood as the wind and currents here favor that theory.

Plate XIV shows a part of the woodlot of Malcom Paine where one hundred and fifty-four egg-clusters were taken; the most of them were found on the dead limbs, twigs and leaves

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Near view of the D. L. Donnell place

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by ground scouting and shows that they probably were brought across on the drift wood, etc., and were so nearly grown as to pupate at once on the ground and the female laid her eggs on the leaves and twigs, while on the Thaxter place just across the river most of the egg-clusters were found on the trees. This area, embracing the four estates, covers about one hundred and fifty acres. Only a superficial scout had been made, but the whole territory will be put into first class condition for the summer campaign.

Plate XV shows the Thaxter infestation situated between Brave Boat Harbor and Cutts Island taken at a distance to show the outline of the largest infestation as yet discovered in the state. This shows only the Thaxter woods where 3,356 egg-clusters were taken.

This infestation was discovered by one of the scouts. He was going from the Thaxter infestation on Cutts Island to the Brave Boat Harbor road so took a short cut across the pasture and as he entered the woods he noticed an egg-cluster on a pine tree. Investigation was immediately begun which resulted in finding that the entire wood lot was infested.

This woodland consists of about three hundred acres and is owned by about twenty different parties. A thorough scout was made covering almost the entire area. 4,179 egg-clusters were taken in this tract of woods. (The other lots are not shown in this cut.) Four crews of men were put into the wood for the purpose of clearing up ready for next season's work.

About one hundred acres have been gone over; trees thinned out; brush raked up and burned; in fact the ground has been gone carefully over and cleaned thoroughly.

Plate XVI shows a portion of the Thaxter woods after the clearing and cutting out.

Had these woodland colonies been discovered last year much greater progress would have been made in the work of extermination. As it is we are up against a serious problem in this section and it will require a larger force to handle the infestations in this section than all of the rest put together.

These woodland colonies are the ones to be dreaded as it will necessitate the burlapping of a large number of trees and in some cases spraying may have to be resorted to, which is the

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most expensive method of any, but absolutely necessary in some instances.

Plate XVII shows the mark used to designate a woodland colony. The tree is at the entrance of the Thaxter woods, the arrow pointing toward the woodland colony and the figure 7 under this mark indicates the year in which it was discovered.

Plate XVIII shows one of the government crews which scouted over the territory above referred to. Plate XIX shows the same crew at work in the Thaxter lot.

We wish to express our appreciation for the very cordial reception that has been extended to our department, to the field agent and to the several men in the field force, and for the kind treatment secured at the hands of the property owners and others residing in the infested district. The work could not have progressed so satisfactorily unless this had been done. On the Thaxter estate, where the woodland colony was first discovered, every courtesy was extended. Mr. John Thaxter rendered all the assistance in his power, even going so far as to hire men to aid in the cleaning of his wood lot, and was of great material aid in the progress of the work. The same may be said of the others whose adjacent property was badly infested. The property was practically turned over to the department to be treated in the best manner possible. As a result the owners are perfectly satisfied with the work done. (See letter of Mr. Thaxter.)

If this preparatory work had been neglected it would take the total appropriation to handle this one woodland colony during the coming summer.

Men have been employed in the different towns where the work had been conducted, and they will be continued in the work as they take a deep interest and are anxious to have it thoroughly done.

VOICES FROM OUTSIDE.

Summer visitors and others who come to us from infested districts in Massachusetts and New Hampshire have caused no little uneasiness by their very positive assertions that we were badly infested, in certain sections of the State, with the gipsy moth, these sections being outside of the limits of both the gipsy and brown-tail infestations. A number of such reports came to the office during the season; one where a certain man

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PLATE XIII



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Method of burlapping limbs of trees to trap Gipsy Moth caterpillars

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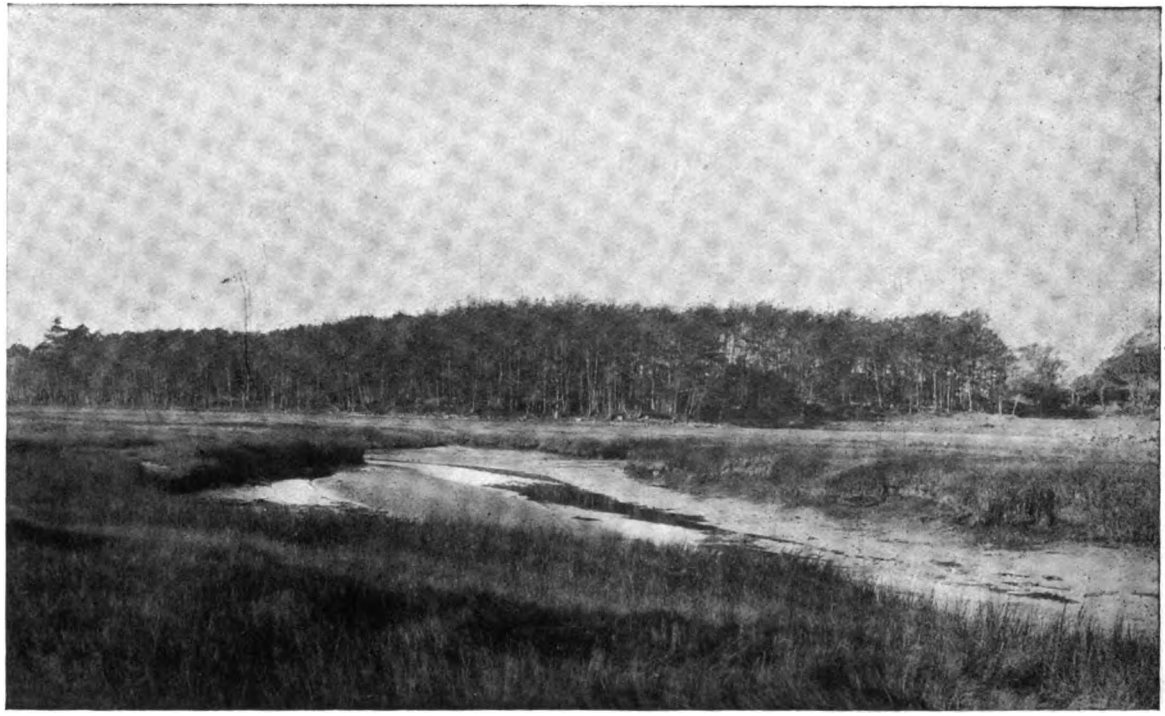


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Totman's crew doing ground scouting in the Paine woods, York, Maine

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Thaxter woods from marsh

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A section of the Thaxter woods after cleaning

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PLATE XVII



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Tree showing woodland colony mark

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Soule's crew of Government scouts

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PLATE XIX

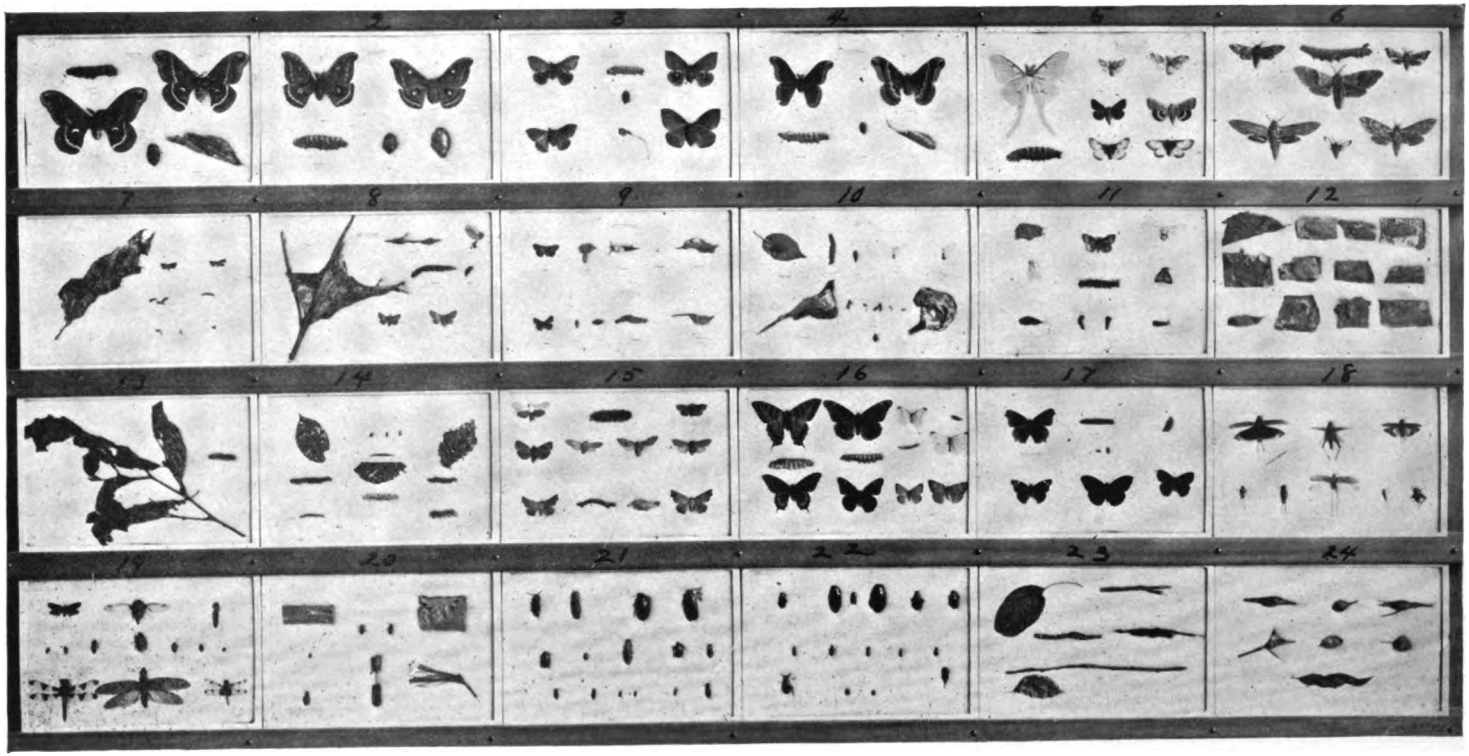


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Soule's crew scouting the Thaxter woods

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went to considerable trouble and expense to remove limbs from a tall elm tree, the infestation being the mourning cloak caterpillar.

People are beginning to realize that there are other caterpillars in the State, and other egg-clusters besides those of the gipsy. Yet in every case it is much better to be over cautious in regard to these pests than to take no interest in the matter.

In many cases the insects were destroyed and the statement made that the gipsy caterpillar had been found in that locality.

A great deal of uneasiness and annoyance could be saved if, as soon as doubtful specimens were found, they were mailed to the department. The information would be only too gladly given and much time and sometimes expense be saved. We are very desirous that infestations, by insects or fungus diseases, of whatever nature, from any section of the State, be reported to the department. This is the only way in which we can keep in touch with the injury caused by our different insect and plant enemies.

The following letters have been received from those in charge of the work in the other infested states.

6 Beacon St., Boston, Mass.

DEAR PROF. HITCHINGS:

In reply to your letter would say that there has been spent from the Federal appropriation from October 14 to December 31, 1907, $3,035.80, and we still have twenty-two men at work in your state.

I am pleased to state that the Maine Department of Agriculture, through you and your Special Field Agent, has put up a strong and agressive fight to save the state from invasion by the gipsy moth. I have visited the infested territory frequently, and have always found that whatever seemed possible to be done was being pushed vigorously.

'With the scouting work which is being done this winter you ought to have a pretty thorough knowledge of the extent of the infested territory in Maine, and with the men that are being trained, will be in a better position than ever to carry on the work toward final extermination.

The clearing up of the Thaxter woodland in Kittery is an ideal piece of work, and I think deserves especial commendation, although the work in all of the towns is first-class and along the best lines known in the work against the gipsy moths.

Very truly yours,

D. M. ROGERS,
U. S. Special Field Agent.

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6 Beacon St., Boston, Mass.

DEAR PROFESSOR HITCHINGS:—

Yours of the 5th asking for information concerning the gipsy moth work in Massachusetts, is at hand. The appropriations made by the State for the work in 1907 were as follows:

Field work	$295,000 00
Importing parasites	25,000 00

In round figures the State expended $240,000, the cities and towns $140,000 additional, and property owners, so far as our records show, expended $143,000. This does not include upward of $100,000 spent in protecting the park systems, or an amount probably as large paid by wealthy private citizens to contractors and others. The total area infested by the gipsy moth in Massachusetts is 3,148 square miles, and includes 165 cities and towns.

The residential sections and street trees over some 9,000 miles of streets and roads have been thoroughly worked over and the moth completely brought under control. In the farming districts outside of the woodland the pest is also well in hand. Much work has been done in suppressing the gipsy moths in woodlands, but there is still a very large problem of this kind in sight.

It naturally follows that our future work will be directed first to holding the ground gained, and second to stamping out the large woodland infestations. With such hearty coöperation as is shown in carrying on this work by all parties interested, there is no question but that the control of the moth can be obtained in the course of a few years.

The great danger of course is that when the moth is brought under control the necessary appropriations may be stopped or so much reduced as to give the pest a chance to again increase.

The work of importing parasites for which the State of Massachusetts is furnishing the funds, and Doctor L. O. Howard the expert supervision, is being prosecuted continuously, and the prospects for success in securing many natural checks on the increase of both moths never were better than at present.

Yours very truly,
A. H. KIRKLAND,
Superintendent.

Dover, N. H.

PROF. E. F. HITCHINGS, *Augusta, Maine.*

My dear Prof. Hitchings:—Yours received. According to our most recent data, we have forty-five towns infested with the gipsy moth, covering an area of about fifteen hundred square miles. Our infestations seem to be confined in a large degree to orchards and some shade trees. State appropriation was $25,000.

Yours very truly,
THOS. H. DEARBORN.

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R. I. College, Kingston.

MR. E. F. HITCHINGS, *Maine Agricultural Dept., Augusta, Maine.*

My dear Mr. Hitchings:—In accord with our arrangement in a conversation which we had at the State House, Boston, on Friday, and also with the request in your letter, which I found on my desk when I returned here, I beg to present the following brief statement of conditions of the gipsy moth infested territory in this State.

The moth has probably been in the State for nine or ten years and has now spread over a territory of 25 square miles, or perhaps a little more. A State appropriation enabled us to begin a campaign against the insect two years ago. As a result of our work at that time, we found that the territory was much larger than was supposed at the time the appropriation was given. The first appropriation was $5,000. In order to cover the larger territory we received $10,000 from the State last year. The United States Department of Agriculture also spent approximately $6,000 during the winter of 1906-7. The Department has about twelve men at work in the State at the present time.

As a result of the past two years' work by the State and by the United States Department of Agriculture, the infested territory has been thoroughly gone over both with burlaps and in the winter cleaning work, and less than 1-10 as many moths in the various forms have been found this year as we found the first year.

The main infested area embraces Providence and parts of the adjoining towns of Cranston, Johnston, North Providence, Pawtucket and East Providence. In this region we have found a few new infestations this past fall and winter, but there are also a great many places which were infested a year ago in which we have found no evidence of the presence of the pest. Recently Mr. Rogers reports to us that his scouts have found three nests in two places in the town of Cumberland, in the Northeastern part of the State, and one or two nests have also been found in the town of Lincoln.

We feel very much encouraged over the results of the work of the past two years and believe that if we had the necessary funds we would stand a good chance of exterminating the pest. It is doubtful, however whether we can secure sufficient money for this purpose, and we shall probably have to content ourselves with keeping the moth thoroughly suppressed so as to reduce the chances of spread and damage to the minimum.

Yours very truly,
A. E. STENE.

New Haven, Conn.

MR. E. F. HITCHINGS, *State Entomologist, Augusta, Maine.*

Dear Sir:—Your letter has just been received, and in reply will state that the conditions are most favorable for the extermination of the gipsy moth colony in Connecticut. The infested area at Stonington has not increased, and only about one-third the number of caterpillars were found in 1907 that were gathered in 1906, though we had twice as many

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men at work, banded ten times as many trees, and have cut the brush over nearly twice as much ground as is actually infested. This winter a careful examination has been made by the men, and something over one hundred egg-masses have been found and destroyed. It seems hardly possible that many could have escaped. I am sending you a copy of the law passed by the last legislature, which gave an appropriation of one thousand dollars and as much more as might be needed up to ten thousand dollars, for the two years. I have already drawn twenty-five hundred dollars in addition to the one thousand mentioned in the bill, and this is nearly expended.

A few days ago, however, we learned that the insect had been found at Springfield, Mass., and as this is only a few miles from our northern boundary, I fear that we may find it in that vicinity. In the course of two weeks or so I expect to send some of our scouts to examine the region between Hartford and the Massachusetts line along the river to see if it can be found there. I am afraid it may appear at any time in some other portion of the state, but I feel fairly confident that we can exterminate the colony at Stonington.

Very truly yours,

W. E. BRITTON,
State Entomologist.

Kittery Point, Maine.

PROF. E. F. HITCHINGS,

Dear Sir:—As a desire for my opinion has been expressed regarding the work done up to the present time in preparing to fight the gipsy moth, as it affects my woodland, etc., I take pleasure in stating that it has been eminently satisfactory to me. In the woodland the ground has been thoroughly cleared of dead wood and underbrush, the trees have been thinned, trimmed and entirely cleared of dead limbs, so that I have now only young and vigorous growth, and the land has the aspect of a park.

In the orchards the work has been equally thorough. The trees have been well trimmed and scraped, the scars made by trimming have been painted, and the holes wherever found have been covered with tin. The work in both cases has been done with no more expense to me than what of my own accord I chose to assume, and that has been so little compared with the amount expended on my property by the State and Federal Government, as to be hardly worth mentioning.

In closing I will say, that with the work of preparation done on so large a scale and in such a thorough manner, it seems to me that the work of combatting the pests next season must be reduced to a minimum.

Thanking you and all those who have had charge of the work,

I remain yours truly,

JOHN THAXTER.

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NURSERY INSPECTION.

The nurseries of the State as a whole are in good condition. Some are all that could be desired while others need a little more attention in order to furnish the best possible stock for the market. Two nurseries have been added to the list during the year, one owned by Mr. Linwood Fernald of Eliot. He carries a stock consisting of ornamental shrubs, rose bushes, etc. For small fruits he has blackberry, raspberry, and current bushes.

This place was inspected on April 19th and a certificate granted. The inspection was made early on account of the owner wishing to ship stock. The annual inspection usually comes in August.

The other nursery was that of W. C. Fogg & Son at Freeport. The stock in this nursery was mostly blackberry and raspberry bushes and strawberry plants. These were found to be in good condition. They were all from stock raised in the State so were not infested. This nursery was inspected May 18th, and a certificate granted. These had not reported so it was not known by the department that they existed. One nursery was dropped from the list, "The Maine Nursery Co." of Hampden. This was on account of the death of the proprietor. As no decision was reached by the company regarding the advisability of continuing the business no certificate was granted this year.

Our nursery men of the state are keenly alive to the necessity of keeping their stock in the best possible condition as regards fungous disease and insect infestation, and the leading ones are taking every precaution and are constantly applying both insecticides and fungicides to keep their stock in first class condition at all times.

Inspections are made in August and certificates are given good for one year. It is earnestly desired that all growers of small fruit in the state shall report to the department as we wish to keep in close touch with this part of the work. Although inspectors in most of the states do not encourage the importance of looking after the small fruit industry yet we realize that it is through this medium that some diseases and insect pests may reach us. San Jose Scale very often exists on currant, gooseberry, raspberry and blackberry bushes and it would be an easy

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matter for such stock, shipped from an infested district, to be infested with this most pernicious scale. It is as much for the growers' interest as it is for the purchasers' that only perfectly healthy stock is brought into the state. We cannot place too much stress upon the necessity for all growers of such stock to send in their addresses to the department, and not only these but all strawberry growers as well. The strawberry weevil has done considerable damage during the year; we desire to obtain all the information in regard to the different locations in the state where this beetle is found. Will parties who have been troubled with them kindly report to the Department, so that some action may be taken to prevent the further spread of this strawberry pest.

There is hardly an insect pest that may not be controlled by united, intelligent effort on the part of our farmers and horticulturists.

Here is where co-operative measures will work to the best advantage. If each one of the 64,000 farmers in the State should unite to get rid of some common orchard pest, such as the railroad worm for instance, we should hear but little about our fall fruit being ruined by this insect. In fact the only way to get rid of it is by just such effort.

We cannot spray to destroy it and there are no parasites or fungous diseases to aid us. One helpful characteristic of this insect is that it spreads very slowly from one section to another. If the apples are picked up, or eaten by sheep or hogs soon after they drop of course the larvæ will be destroyed, but if they remain on the ground the larvæ on reaching maturity will crawl from the apple and enter the ground, there to pupate and remain through the winter and spring. When the adult flies emerge in early summer they will generally lay their eggs on the apples in the same tree under which they passed the winter. If all fruit growers would combine to fight this pest in a systematic manner the profits in fruit raising would be increased at least 10 per cent.

BOTANICAL INVESTIGATION.

On August tenth one of the field force sent in some leaves and twigs of the white pine from York county which had begun to turn brown. He reported the trouble to be quite common in that section. Later on we visited the place and examined

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several of the trees. An investigation was made by the Bureau of Plant Industry at Washington and a large amount of material was gathered to be used in the endeavor to ascertain the real nature of the trouble. We wrote to the bureau and received the following reply.

"My Dear Sir:—Your recent inquiry concerning the white pine disease addressed to the Bureau of Forestry has been referred to myself. During the month of September an investigation was made of the disease as it occurs in New England, New York, and New Jersey. The indications are very strong that the trouble is of a fungous origin, and therefore infectious, but it is necessary that another season's work be done before this point can be made a certainty. Because of our uncertainty regarding the nature of the trouble, I have been recommending the cutting of the dead and dying trees and burning the brush from the same. I do not recommend the cutting of slightly affected trees, leaving that to personal judgment of the owner. Thus far the fungus Septoria parasitica had been found occurring almost universally as an accompaniment of this disease. Certain facts observed in the field tend to show that frost and drought are not responsible for the trouble; but, as said before, the exact original cause is yet somewhat in doubt. It is proposed to determine this as soon as possible, and to that end considerable time will be devoted during the next spring and summer to field observations and experiments in various localities in New England and New York.

Regretting the unsatisfactory state of our knowledge of this trouble, I am,

Very truly yours,"
PERLEY SPAULDING,
Scientific Assistant.

Several species of plants have been identified during the year, some as noxious weeds and others proved to be beneficial.

BIRD NOTES.

No time was spent by the men in the field on bird study, so that what was recorded in the note books was purely accidental. No doubt many notes could have been secured if a little time could have been given to this side of the question. I will name a few cases that came under the observation of the men.

On June 16th a scarlet tanager was seen feeding on the larvæ of the brown-tail.

I quote from G. H. Forbush's "Useful Birds and Their Protection" published by the Massachusetts Board of Agriculture. "As a caterpillar hunter this bird has few superiors. It is

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often very destructive to the gipsy moth, taking all stages but the eggs, and undoubtedly will prove equally useful against the brown-tail moth."

The scarlet tanager is one of our rarest summer varieties and is seldom seen by those unfamiliar with our feathered friends.

They occasionally forget their natural shyness and are bold enough to appear in the orchard just for a moment on some chase for a choice tidbit in the line of a flitting moth or butterfly, their bright scarlet breast giving a quick flame of color as they dart here and there in their rapid flight. We trust they may find the brown-tail larvæ just suited to their taste.

On June 21st a catbird was detected feeding on the brown-tail caterpillars. This bird is known to feed its young almost wholly on insects, and it may take the brown-tail larvæ occasionally.

July 11th a Baltimore oriole was discovered feeding on tent caterpillars, but the observer couldn't tell whether any brown-tails were being disturbed.

"Professor Beal finds that eighty-three and four-tenths per cent of the oriole's food consists of animal matter, caterpillars forming thirty-four per cent of the whole. Evidently the oriole is one of the first among the birds known to destroy hairy caterpillars, and for this alone it may be ranked as one of the chief friends of the orchardist and forester. The tussock, gipsy, brown-tail, tent and forest caterpillars, the fall web-worm, and even the spiny caterpillar of the mourning cloak butterfly,—all are greedily eaten by the Baltimore."

(Forbush.)

August 9th an Indigo bunting was seen tearing the burlap from the trees to make her nest from the threads. Other cases were observed by the men, or the finished nests found.

"This bird feeds more on the caterpillars that infest trees and bushes than do most sparrows, and takes many such larvæ to its young."

(Forbush.)

STATE EXHIBITIONS AT FAIRS.

Many requests are received asking for a collection of injurious insects to be placed on exhibition at the different Fairs in the State, and it was deemed best to comply with the requests

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as this would come under the duties of the department as required by the Act passed by the last legislature.

Three sets of twenty-four mounts each were prepared at the office. Plate XX shows a sample set of the mounts. Each mount is 8"x12", and the life histories of some of our most noted insect pests are shown. Exhibits were made at the three State Fairs, Bangor, Lewiston, and Waterville, after which they were sent to Presque Isle, Cherryfield, South Paris, Gorham, Foxcroft, State Board of Trade at Portland, Belfast, Fryeburg, Livermore Falls, Farmington, Freeport, Damariscotta, Topsham, Bluehill, and Cumberland Farmers' Club at West Cumberland.

At all of these places a great deal of interest was shown and many requests for bulletins and reports were made. Two members of the force were in attendance at the State Fairs and one at each of the others. These were kept constantly busy answering questions regarding the different insects shown, and other pests found in the different sections of the State.

There is no method so effective for the dissemination of information as by an object lesson of this kind. Specimens were brought in for identification, followed by many others later in the fall. During the session of the Annual Meeting of the State Pomological Society held in Gardiner, a collection was on exhibition. Much interest was manifested and the usual questions were answered, especially pertaining to orchard and fruit insects, together with requests for bulletins.

By request of the Secretary of the State Grange one of the collections was sent to Lewiston at the annual meeting held in December. As a result 600 gipsy bulletins were sent out to different granges in the State. At no other time in the work has such an interest been shown as during the past season.

By request of the president of the State Board of Trade one of the collections was on exhibition at the annual meeting held in Portland. It was in charge of a member of the field force.

If it is deemed best to continue this work another fall it will be done under a different system, one that will appeal more strongly to the farmer in the methods adopted by him of exterminating the different insect pests and fungous diseases that may be encountered.

Explanation of State Exhibit made at the State Fairs.

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No. 1 shows the life history of the American Silk moth, *Samia cecropia;* the caterpillar, pupa, cocoon, male and female moths.

No 2 shows a similar life history of the polyphemus moth, *Telea polyphemus.*

No. 3 is a life history of the io moth, *Automeris io;* the egg-cluster, caterpillar, pupa and moths.

No. 4 is a life history of the promethea moth, *Calosamia promethea.*

No. 5 shows on the left the caterpillar and male adult of the luna moth, *Tropaea luna;* in the upper row a pair of lappet moths, *Tolype vellida;* in the middle row at the left a *Catocala antinympha,* and at the right a *Catocala concumbens;* and below a pair of Buck-moths, *Hemileuca maia.*

No. 6 shows a caterpillar and the moths of six of the Sphingidae, the so called sphinx or "hawk" moths. Beginning at the left in the upper row, *Paonias excaecatus, Marumba modesta,* and *Smerinthus geminatus;* and in the lower row, *Sphinx gordius, Hemaris thysbe,* and *Sphinx plebeia.*

No. 7 is a life history of the cherry-tree ugly-nest, *Archips cerasivorana,* with parasites of the same.

No. 8 shows a life history of the apple-tree tent-caterpillar, *Malacasoma americana,* illustrating the nest, egg-cluster, caterpillar, cocoon, pupa, male and female moths.

No. 9 contains life histories of the white-marked and old tussock moths, *Hemerocampa leucostigma,* and *Notolophus antiqua.*

No. 10 is a life history of the brown-tail moth, *Euproctis chrysorrhoea,* with some of the common parasites that destroy this pest while it is in the pupa stage.

No. 11 shows a life history of the gipsy moth, *Porthetria dispar.*

No. 12 shows twelve kinds of wood on which gipsy females have deposited their eggs: White pine, black cherry, white birch, hornbeam, white oak, red oak, beach, white maple, hemlock, juniper, black birch, gray birch.

No. 13 contains a caterpillar and nest of the fall web-worm.

No. 14 shows the elm leaf-beetle *Galerucella luteola,* and leaves on which it has worked; red-humped and yellow-necked caterpillars, *Schizura concinna* and *Datana ministra;* two species of hickory tiger caterpillars, and a corn worm, *Papaipema nitela nebris.*

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No. 15 contains in the upper row from left to right a salt marsh moth and caterpillar, *Estigmene acraea,* and a tiger species. The second row contains specimens of tiger moths and the third row is life history of the Geometrid moth, *Ennomos magnarius.*

No. 16 shows a tiger swallow-tail butterfly and caterpillar, *Papilio glaucus turnus;* a monarch butterfly and caterpillar, *Anosia plexipus;* a male, female, caterpillar and chrysalis of the cabbage butterfly, *Pontia rapae,* and in the bottom row a black swallow-tail, *Papilio polyxenes,* a viceroy, *Basilarchia archippus,* and a male and female sulfur, *Eurymos philodice.*

No. 17 contains specimens of butterflies, at the top a mourning cloak, *Euvanessa antiopa,* its caterpillar, chrysalis and parasites. The lower row contains a *Vanessa atalanta,* and two wood butterflies.

No. 18 is a mount of grasshoppers and crickets.

No. 19 shows a caddis fly, harvest fly, *Cicada tibicen,* and a stone fly in the top row; two tree hoppers, a soldier bug, the cast skin of the harvest fly, and three spice bugs in the second row; a large dragon fly, *Libellula pulchella,* a dobson fly, *Corydalis cornuta,* and a small dragon fly in the last row.

No. 20 shows several enemies of the pine. Four borers, *Dendroctonus terebrans, Rhagium lineatum, Conophorus coniperda,* and some of their work, also eggs of pine lice.

No. 21 contains injurious beetles, "June bug," *Lachnosterna fusca,* potato beetle, *Leptinotarsa decemlineata,* larder beetle, *Dermestes lardarius,* and rose chafer, *Macrodactylus subspinosus.*

No. 22 shows a mount of beneficial bugs and beetles; scavengers, burying beetles, tiger beetles, and "Lady bugs."

No. 23 contains scale insects and a fungous disease, San Jose scale, *Aspidiotus perniciosus,* Lecanium scale, *Eulecanium cerasifex,* Scurfy scale, and black-knot, *Plowrightia morbosa.*

No. 24 shows galls taken from golden-rod, willow and rose bushes.

ENTOMOLOGY IN THE SCHOOLS.

In these days of advancing thought and research along lines that aim to give a general uplift to our whole educational system it would seem that one's education could not be complete unless it embraced some knowledge of our natural world about us.

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Physical geography is included in the school curriculum from the lowest grades to the college preparatory school; from its local application of hills, valleys and rivulets surrounding the child's home, to the study of the science in its different phases by the student of astronomy, geology, zoology, botany, etc. Of course nature study may seem to be a fad and is so classed by many but what is life without its "fads?"

One of Maine's noted instructors, a gentleman of fine culture and scholarly attainments, a former president of one of our colleges and a professor of long standing, said to me one day, after he had retired from his active life work as an instructor, "I would give a great deal if I had a hobby on which to concentrate my thoughts in my leisure moments. Life would seem broader to me and I could enjoy it to the full. I never realized before what I have been losing out of life all these years."

Mother Nature is only too willing to render aid whenever called upon to do so. There is nothing so fascinating to the child's mind—and "We are but children of a larger growth"—as to get close to nature's breast and drink deep from her hidden springs.

We retain those lessons and they are revealed to us in after years, bringing joy and blessings to our maturer years. The nature lessons, brought in now and then by the tactful teacher, give an added impetus to the work of the day and the language lesson that follows will be the richer for the effort.

The science of entomology, or insect life, offers a fascinating field for nature work.

It would be a good plan for each teacher to get her school interested in this sort of nature work. Specimens could be brought in by the scholars and reserved until the day for the lesson. In the meantime they could find out all they could about them so as to be ready for the lesson. Perhaps the teacher would need a little time for preparation as questions might be asked that would be a little puzzling to a novice in the art of "bugology." Several lessons of this nature during the term would be of great benefit to the school in more ways than one. We stand ready to aid one and all in this work by furnishing what literature we may have, and specimens for study when practicable.

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STOCK ON HAND.

The following supplies were purchased in 1907 and are in stock. They are in the storehouse in York under the charge of one of the Chief Inspectors, and when let out are charged up to the men until returned.

List of Supplies Bought in 1907 and on hand Jan. 1st, 1908.

2 Spraying machines.	6 pr. Body straps.
400 feet Rubber hose.	2 doz. Creosote cans.
2 Cyclone burners.	1 doz. Mirrors.
1 Knapsack spray.	2 Bush hooks.
1 Hand pump.	2 Axes.
25 bbls. Burning oil.	4 Pitchforks.
500 lbs. Arsenate of lead.	1 doz. Axe handles.
160 lbs. Tanglefoot.	1 Extension ladder.
1 bbl. Tar.	2 Short ladders.
7500 yds. Burlap.	2 Compasses.
3 bbls. Twine.	2 50 foot Tapes.
10 Marble axes.	1 doz. Bark knives.
16 Chopping axes.	8 sets L & T couplings.
10 Pruning saws.	2 Cyclone nozzles.
10 26-inch saws.	1 Grindstone.
2 Crosscut saws.	1 Axe stone.
2 One man crosscut saws.	6 cans Paint.
16 Bench scrapers.	1 pr. Hinges.
4 Rockdale pruners.	1 Tool box.
1 Branding iron.	8 Iron wedges.
8 Steel letters.	1 pr. Thinning snips.
6 pr. Saw handles.	3 Hammers.
8 pr. Field glasses.	2 Shovels.
6 pr. Climbing irons.	1 Bush scythe and snath.

PUBLICATIONS AND CIRCULAR LETTERS OF THE YEAR.

Owing to the advent of the gipsy moth into the State, and of the need of some changes that were thought desirable regarding the brown-tail moth work and nursery inspection, it was thought best to have a new act drawn that would more fully cover the new conditions that had arisen during the past two years.

A public hearing before the Committee of Agriculture was held February 6th. A very large delegation was in attendance representing the leading business interests of the State. It was the unanimous opinion of all present that every possible means, that could be adopted, should be used to control or exterminate the gipsy and brown-tail moths. The new bill as presented

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carried an appropriation of $30,000 a year for two years. This passed both houses without a dissenting voice, and was signed by the Governor February 15, 1907. As soon as the necessary printing could be secured active work was begun.

On February 19th the following letter accompanied by a copy of the law was sent to every first selectman and mayor in the infested district.

STATE OF MAINE.

DEPARTMENT OF AGRICULTURE.

Augusta, Feb. 19, 1907.

To the Clerk of.....

My dear Sir:—I herein enclose a copy of the bill approved Feb. 15, 1907, referring to the protection of trees and shrubs from contagious insects and diseases.

Kindly read sections 7 to 13 carefully, and see that proper action is taken in the matter, especially to make such an appropriation as is necessary to cover sections 7 and 12.

You will see by the bill that the legislature has decided that the gipsy moth should be handled through this office. It is necessary to do so as there is too much danger involved to leave it in the hands of cities and towns, as the work must be done by those who have had experience in suppressing the moth.

Cities and towns must see to it that this law is enforced, and the proper time to do the work is early this spring before the caterpillars crawl from their nests. One dollar expended now will save ten in spraying. There is something for every city and town in the infested district to do in this work.

We trust you will appreciate the situation and lend your aid in every way possible.

Very truly yours,

On March 8th the following was sent accompanied with a copy of an eight page "Circular of Information on the Brown-tail Moth," which had been written expressly for this purpose.

STATE OF MAINE.

DEPARTMENT OF AGRICULTURE.

Augusta, March 6, 1907.

To the Municipal Officers of.....

Sufficient evidence that your town is infected with the brown-tail moth has come to me. Therefore, I hereby give you notice in accordance with Section 7 of Legislative Act approved Feb. 15, 1907, relating to the protection of trees and shrubs from the introduction and ravages

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of dangerous insects and diseases, that you shall immediately cause to be destroyed the brown-tail moths in your town, as provided by said Section and Act.

I herewith enclose a copy of the "Circular of Information on the Brown-tail Moth."

Respectfully yours,

Commissioner of Agriculture.

This was followed on March 25th by the following:

STATE OF MAINE.

DEPARTMENT OF AGRICULTURE.

Augusta, March 25, 1907.

To the Selectmen of.....

My dear Sirs:—Have you complied with section 7 of the new law of 1907 referring to the protection of trees and shrubs from injurious insects, and notified the property holders in your town to clear up the nests of the brown-tail moth on their trees? Have you cleaned up all streets and highways throughout your town? If you have not complied with the law, please do so at once and limit the time to April 15. If your town made no appropriation for this work, you can use your contingent fund for the purpose.

Kindly reply to this at your earliest convenience.

Very truly yours.

The regular quarterly bulletin from the department was given over to this bureau and the "Gipsy Moth in Maine," a bulletin of eighteen pages devoted to an historical account of the moth together with its life history and advent into Maine was written and sent out as the March Quarterly.

The following letter from State Master O. Gardner, and the accompanying one from the State Entomologist were sent to the secretaries of the different granges in the State.

Rockland, Maine, April 15, 1907.

To the Patrons of Maine,
Greeting:

Brothers and Sisters:—I herewith call your attention to the serious fact that our State has been invaded with those dangerous and destructive insect pests, the brown-tail and gipsy moths, which threaten the future welfare and prosperity of our State in the destruction of our forests. For the suppression of these pests the legislature has appropriated $30,000 a year for two years. The authorities will not be able to accomplish much without your earnest and hearty co-operation.

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The law covering this appropriation provides that each town shall assist in the work, but the most effectual help must come from the active co-operation of all the citizens everywhere. It is a question that vitally affects the interests of all the members of our Order, and one that must ensure their immediate attention, before it is too late. Now is the time to act; another year will not do.

I ask that you arrange to gather the nests of the brown-tail moth at once, before the young caterpillars leave them. If they once get established in the State as they now are in Kittery and York, it will be impossible to control them, and we shall be at their mercy. I ask in your own interest that you take hold of this important matter and help rid the State of these dangerous pests.

Fraternally,
O. GARDNER.

STATE OF MAINE.

DEPARTMENT OF AGRICULTURE.

Bureau of Entomology.

Augusta, April 15, 1907.

To the Patrons of Maine.

Brothers and Sisters:—I enclose a letter from Brother Gardner which is self explanatory. To this I wish to add a word.

It is now quite thoroughly understood throughout the State that we have in our midst two very destructive insect pests. The Department of Agriculture is doing and will continue to do all in its power to control or exterminate these pests, but we cannot do thorough work unless our farmers and orchardists put their shoulder to the wheel and help along the good work. If the army of 50,000 Patrons in our State will come to the rescue, much can be accomplished. The work of the department on the brown-tail moth will of necessity be educational, as it has been in the past.

Under the new law towns and cities in the infested district have done and are doing excellent work. The work in nursery and orchard inspection will be much more extensive than during the last two years.

Much the larger portion of the $30,000 appropriated will be used in an endeavor to exterminate the gipsy moth which has gained an entrance into York County and possibly Cumberland. This pest MUST BE exterminated at all costs. The national government is assisting us in this matter.

Now what we want of every member of the Order is a hearty coöperation in the matter of an injurious insect campaign, to begin at once. Many of you do not live in the infested district of the gipsy and brown-tail moths, but these may reach you during the coming season, and it is these isolated infestations that we are so anxious about. In anticipation of this fact I earnestly urge that each subordinate grange appoint a committee of three or five to take the matter of injurious insects in

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hand. Send in any suspected insect in whatever stage to the department for identification. We will gladly furnish any literature on the subject that we may have, and give information in every case possible.

Kindly let us hear from you.

Yours fraternally,
State Entomologist.

A second notification was sent on April 19th to towns that had not made returns to date. It was similar to the one sent on March 25th but was stamped "Official" in red ink, and had the following:—"P. S. This is the second and final notification. Please report at once as I must know the condition of your town as regards the brown-tail moth work."

On June 1st the following blank was sent to each city and town clerk in the district for an official record.

STATE OF MAINE.

DEPARTMENT OF AGRICULTURE.

Augusta, June 1, 1907.

To the Clerk of.....

My Dear Sir:—Kindly fill out the following blank and return at your earliest convenience.

The amount of money appropriated by the town for work on the brown-tail moth for 1907.....
Amount of money expended for same.....
What system of payment was adopted, bounty or day labor.....
If bounty how much per dozen.....
If labor how much per day.....
Number of nests taken.....
Estimated number by private individuals.....
Is the new law satisfactory in your section.....
How many non resident taxpayers have you.....
What is the amount of taxable property so represented.....
Do these people take kindly to the new law.....
Remarks .....

On October 21st a notice was sent, similar to the one in the spring, notifying the cities and towns to attend to the brown-tail work and to have all trees cleared by the first of January, 1908.

Some pocket field note books were prepared and furnished to each man. In these a daily record of all work done in the field is kept. On the inside cover pages the following "General

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Rules" and "Circular" are inserted, which will explain the work required.

GENERAL RULES.

1 No person will be retained on the force who uses intoxicating liquors as a beverage.
2 All smoking is strictly forbidden during working hours.
3 Gentlemanly and considerate conduct is required of all employees.
4 All employees when on duty must wear the regulation badge of this department.
5 When an employee leaves the service this badge must be returned to this office with all other material belonging to the department that may be in his possession.

INSPECTION RULES.

1 Each inspector must keep in this field note book a complete daily record of all work done by him.
2 Each field book is a monthly record and must be turned in to the special field agent at the end of each month.
3 Employees must exercise great care that they do not carry living larvæ from place to place.
4 No fires shall be kindled except by special orders from this department.
5 All employees must exercise great care not to injure lawns, flower and vegetable gardens or other property.
6 Each inspector must pay special attention to the trees and shrubbery along the lines of railroads in his territory. The grounds around railroad stations must be carefully inspected.

RULES FOR REPORTS.

1 The standing of inspectors will be based not only on the quality of work done but on the accuracy and fullness of their reports. Observations on the habits of insects and birds and other items of interest should be embodied in this report.
2 Each inspector must make out his report daily and send it to the field agent on the following morning.
3 All reports are forwarded to the State Entomologist and are subject to his approval.
4 Inspectors must state in their reports the language and means used by persons who try to obstruct the work. The names and addresses of such persons should be secured.
5 If dogs annoy the inspector he may require the owner of such to confine them, under penalty of law. Such cases should be entered in the report.
6 In case of absence from work the daily report must show the reason for the same.
7 Inspectors must report the correct location of property inspected together with full name of owner or occupant.

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8 Inspectors must note in their reports the dates when they are visited by the State Entomologist, field agent or other interested parties.

CIRCULAR.

BROWN-TAIL MOTH INFORMATION.

1 Indicate the food plant (list of trees, shrubs, etc. on which nests are found).
2 Note the preferred food-plant (where the greatest number of nests are found).
3 Date of earliest feeding in spring.
4 Note if the caterpillars return to nest at night. If so do they enter the nest?
5 Do they feed together in colonies or separately?
6 Watch carefully to see if birds eat the larvæ, if so determine the species.
7 Note the presence of any parasites (Ichneumon flies or other insects) around the caterpillars. Capture some if any are seen.
8 Note any seemingly unhealthy caterpillars as if affected with a fungus disease. If so send in to department.
9 Give date of first pupation and last seen.
10 Note any parasites in pupæ, and collect a number and send in for experiment.
11 Note the first appearance of the moths by watching at lights, either electric or lamps set in window. Capture specimens and note if male or female predominate, and give number of each taken.
12 Give date of first eggs deposited. On what food-plant. Do they lay mostly by day or night? Leave egg-clusters on a dozen plants and mark location.
13 Note the last eggs deposited. In fact keep a daily record of egg deposit.
14 Watch to see if birds eat the eggs and note the fact.
15 Give dates of hatching for the twelve numbered egg-clusters which you marked. (See No. 13.)
16 Do birds or parasites trouble the young caterpillars?
17 Give date when the caterpillars begin to construct their winter homes.
18 Note when they have stopped feeding or have finished their nests.
19 How many leaves have either of the 12 colonies fed on?
20 Send in to the department all insects captured. Mail live caterpillars, with food plant, in close tin boxes.

The following rules regarding the gipsy moth have been adopted by the Commissioner of Agriculture.

RULES ADOPTED BY THE COMMISSIONER OF AGRICULTURE.

1. All persons are forbidden by law to convey any stage of the gipsy moth from one place to another in the State.

2. No person shall send the same by any method of conveyance unless by order of the State Entomologist.

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3. All persons are forbidden to remove any designating marks employed by the inspectors in their work on the gipsy moth.

4. On account of the danger of further spread of the gipsy moth, all persons are strictly forbidden to remove any eggs of the gipsy moth from their premises.

5. Persons discovering any stages of the gipsy moth on their premises should immediately notify the State Entomologist at Augusta of the fact.

6. Any party in the infested district wishing to cut and remove trees for lumber or other purposes shall notify the State Entomologist of such purpose so that such trees may have a thorough inspection before being cut.

MAINE APPLE ORCHARDING.

Only a small per cent of our orchardists have begun to realize the economic side of orchard management. The majority still persist in adhering to the same go-as-you-please sort of care, or lack of treatment, and let the orchard remain as it was set to shift for itself; and if Mother Nature is kind enough to allow the trees to yield a half crop once in a while, why they are only too willing to take it for granted that that is the only way, and accept the inevitable as so much clear gain in payment for no care bestowed.

There is no gainsaying the fact that if all of the fruit trees in the State should receive the best of care for the next five years, the owners would reap a clear profit of at least from 25 to 50 per cent on the time and money invested. Those who are inclined to be "fogyish" will at once reply, "That is a bald-faced exaggeration," but the up-to-date, progressive, willing-to-investigate farmer is just the one who will receive this added profit. It is worse than useless to advocate modern methods and expect profitable results when the general public is not willing to make any exertion to prove or disprove the theory advanced.

The profit from right management of our Maine orchards is not a matter of theory but an oft demonstrated fact, and it is only because of gross neglect or total indifference on the part of orchard owners, that a greater income has not been realized from this source. We are stating no new facts but are placing them before you for your careful, unbiased perusal, with the earnest desire that by the repetition of oft demonstrated truths you may be willing to add your influence and energy to the

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advancement of an industry that bids fair to become one of the leading sources of revenue to our progressive farming community.

Although the department at Washington, the many state institutions, pomological societies, and the agricultural press at large have published from time to time books, bulletins, pamphlets, circulars and general items which have covered the whole category of known facts and theories on the subject of orchard care and management, yet we deem it best at this time to place before you a concise digest of the whole subject.

A well balanced system of orchard management is to give due care to all of the essentials such as cultivation, fertilization, pruning, spraying, thinning, picking, sorting, storing, and selling. There are many very important side issues connected with each of the above essentials. Take the matter of fertilization for instance; why! there are enough soil problems so that their solutions would last through the winter evenings.

The line of spraying opens up a broad field for insect investigation and fungous diseases. Make the orchard a business venture and keep an account of everything pertaining to its interests, both on the debit and the credit side. At the end of the year you will know where you stand; and the next year you can profit by your failures. A good first-class apple should be the aim of your endeavors; never be satisfied with anything short of that. If a poor apple is produced there is some good reason for it. Aim to remedy this by a careful study of your orchard. If you haven't the right stock and your trees are too old to top graft, the better plan would be to remove them root and branch and get ready for new ones to take their places. Old orchard land should be kept up and a rotation of crops practiced for a few years before being again set to an orchard.

Definite rules cannot be laid down for every one to follow. Each owner must get acquainted with his soil and trees. His whole business as far as orcharding goes, should be to learn the individual needs of each variety of trees, and then aim to supply these wants.

Trees are much like human beings and each tree has an individuality all its own, and must be dealt with accordingly. As in any other business, one must have a liking for the work and become acquainted with all of the factors that enter into the

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problem. Where one succeeds another fails, although the environments of each may be the same. Success does not depend wholly on the kind of soil or the location of the orchard; these are minor factors.

With a young orchard the first object, after the trees are well set in soil that has had at least two years' preparation, is to adopt such methods of cultivation and fertilization for the land as shall give the best possible healthy growth to the trees. The few years that intervene between the setting and the bearing periods are the most vital to the future productiveness of the orchard. During this period a judicious method of pruning must be systematically followed in order to grow trees of the desired shape.

No orchard will yield good returns unless it receives good care and attention.

Clover is the apple tree's best friend and right hand supporter. It is the economical nitrogen storage battery, the most essential element for the production of the tree.

In any case it is much better for each individual orchardist to try his own experiment to determine what his own particular orchard needs in the way of fertilizer than to go haphazard and think that he must do just as his neighbor or some one else does. The fertilizers required on another orchard might be entirely thrown away on his own. A few years spent in a careful, judicious manner will be the only way to reach a satisfactory solution of the fertilizing problem.

We will assume that the belief is prevalent that it pays to cultivate and spray whatever the other conditions of the orchard may be, so in order to make the fertilizer test one should treat the trees of the whole orchard alike as to all other conditions. This is the only way to make a satisfactory test and if it is not thoroughly and accurately done the owner will be the only loser and the experiment will be a total failure. It is one of the things to be deplored that the average farmer does not try to use his own individuality in his business, but is willing to follow the same methods from year to year that he has learned from those who went before. These tail-end methods are not successful and never will be.

The business methods of a decade past could never succeed under the present system. If not in business why should they

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in farming? The present generation has every opportunity for advancement over the one just passed. Our press is teaming with the successes and failures of the past.

The best literature on agricultural subjects is being distributed broadcast as a free gift to all. Now is the time to adopt the methods of those who have made successes and shun the experiences of those who have made failures. The orchard interests of Maine were never better than at the present time. No better opportunities were ever offered for a thorough revision along the lines of orchard management. Now is the day of reclamation, now is the time for starting new orchards to take the place of those whose day of usefulness has long since passed.

WINTER INJURY TO FRUIT TREES.

There is more or less injury to fruit trees even in an ordinary winter, as many trees continue their growth until late in the season and the new growth does not have time to ripen sufficiently to stand the low temperature. It is conceded by all that the winter of 1906-07 was the most severe that we have had for years and the results are shown by the inspection made. This should not in any way put a damper on fruit raising in Maine.

In the first place another such a winter is not likely to occur in the lifetime of a present orchard owner. And if the lesson is well learned, those who wish to start new orchards will have some idea of what locations to avoid and what are best to select.

SUMMARY OF RESULTS OBTAINED FROM ORCHARD INVESTIGATION.

This investigation showed:

1. That the damage was not confined to a few varieties but affected all to a greater or less extent. (The Baldwin suffered most).
2. That trees were universally killed, if located in cold air runs (so called).
3. That in all cases where wet sags occurred the trees suffered the most.
4. That trees do better on high rather than on low land.
5. That orchards cannot stand a severe winter unless the ground is well frozen.

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ORCHARD CONDITIONS.

Through the data secured the orchard has been studied under all conditions of location; slope of land; wind protection; kind of soil; drainage; cultivated and uncultivated; fertilized and unfertilized; old orchards; young orchards; etc., etc. In fact, under all stages and conditions. Some of the orchards that were badly winter-killed, bore heavily the previous season; others had a very light crop or none at all. In all cases where the loss was heavy the conditions were the same, namely, ground not frozen to any extent; a covering of snow to prevent further freezing; a thaw that started the sap, followed suddenly by a drop in temperature to 20 below zero in many places. At the approach of spring the bark lost its healthy appearance and an examination showed a discoloration wherever injury had occurred.

Limb injury is the killing back of the new growth of the year before. This takes place during almost every winter, especially where the trees make a good growth the previous season, and the climatic conditions in the fall are such as to keep the trees growing until late, the new wood not having time to ripen. There is a difference in the varieties regarding their susceptibility to injury.

We will cite one orchard in each county.

Somerset County.

In Somerset county one orchard of 700 trees having an east cant, lost 250 Baldwins. This orchard had good care, was pruned, cultivated and fertilized. Another located on a southern slope containing 1,000 trees, lost one-half or 50%, mostly Baldwins and Spys. This orchard had had some cultivation, was pastured with hogs and pruned; phosphate and ashes had been used to some extent.

Piscataquis County.

One of the largest orchards in the county, numbering 2,000 trees, situated on rather level land, had 150 trees killed, mostly Ben Davis and Stark. This orchard is under the constant care of its owner, and has been pruned, cultivated, and some ashes used. The dead and injured trees are located in a slight sag running through the orchard. In this orchard the injury is

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shown at the crotch of the tree or at the junction of large limbs, as well as in patches on the trunks, especially on the upper side of those that lean to one side. This injury was probably due to the accumulation of ice at these points, when a sudden change in temperature caused the injury to the cellular tissue.

Kennebec County.

One orchard of 450 trees in the town of China, situated with an eastern slope toward the shore of the lake and a good wood protection on the west lost 430 trees killed outright. The varieties were mostly Ben Davis, Baldwins, Spys, Starks, and Greenings. All the pear and plum trees were killed. The year before this orchard yielded 200 barrels of number one apples. It has had good care and was in a very thrifty condition. The Stark trees had been set three or four years, and the others from 10 to 25 years. The trees not winter-killed were scattered through the orchard and were all McIntosh Red.

Androscoggin County.

In Androscoggin county one orchard of 200 trees, on what was reported as "river land," which is spoken of as a healthy hill-side orchard, lost about 40 trees, mostly Ben Davis and Spy. This orchard was pruned and had some cultivation and the Fisher Formula had been used to some extent.

Cumberland County.

One orchard in the town of North Baldwin contains 800 trees, on broken land and slopes in all directions. Twenty-five Baldwins were killed outright, and fifty very badly injured, besides others that were slightly winter-killed.

Oxford County.

In Oxford county one orchard of 2,000 trees about 25 years old, situated on a southeast slope of a high ridge lost 50 trees; Baldwins, Starks and Ben Davis. The loss was on the lowest land. This orchard was plowed, dressed with barn manure and well pruned.

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Franklin County.

Franklin county. One orchard of 300 trees located on an easterly cant, 25 to 40 feet above shore of pond, lost 200 trees and about 50 injured. One-half of these trees were set within three years. On examination these young trees were found to be dead from about 15 inches from the ground upward. On inquiring we found that the snow was very deep, almost covering the trees, and that about the middle of March there came a very warm day which settled the snow about one-half. The weather changed suddenly much below freezing, which caused the snow to form a very hard crust at the depth above referred to. This was the cause of the winter-killing.

I have selected only a few of the many hundreds of cases recorded. Many others show a loss of from 10 to 75%, or even higher.

INJURY IN OTHER STATES.

In New York during the winter of 1903-04 trunk and branch injury was common, the damage being greatest in the Hudson River Valley where —40° and lower was reported.

On examination the bark and wood of the trunk and limbs were discolored. Many trees partially leaved out, but gradually lost their foliage and died during the summer following. Trees situated in cold air belts without much circulation suffered the most. A similar condition existed in other states.

Avoid setting trees in low ground where the cold air settles and remains as stagnant air. It is a well-known fact that the thermometer always runs much lower in such places. Trees on low ground generally do not ripen their wood so early in the fall and are not so well able to withstand the extreme cold of a winter like that of 1906-07.

SUMMARY OF ORCHARD INVESTIGATION.

As shown under the tables of orchard investigation, there were 950 orchards inspected, with a total of 443,184 trees. The number killed outright was 24,613 or about 5.5%. A safe estimate of the number injured would be at least 25,000 more; so

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that about 11% of the whole number of trees were killed or injured in the 950 orchards.

63	were sprayed	6.6%
764	were pruned	80.4%
255	had good care	26.8%
125	had fair care	13.1%
95	had no care	10.0%
533	had some form of cultivation	56.1%
500	were fertilized with barn manure	52.6%
181	had ashes or some form of commercial fertilizer	19.0%
138	were mulched	14.5%
55	were top dressed	5.8%
113	were pastured with hogs	12.0%
88	were pastured with sheep	9.2%
74	were planted or had hoed crops	7.8%

ORCHARD FERTILIZING.

The question of orchard fertilization is one of paramount importance in our discussion of the best management of the existing orchards in our State. As we look over the situation as represented by the data secured by the orchard canvass, every conceivable condition exists for our earnest study. There is a chance to try every possible method of reclaiming the run down and impoverished soil of the many orchards whose early history dates back fifty or even one hundred years. Not only are these to be considered but the more recent ones must be included in our investigation. Hardly two orchards in the State offer just the same conditions for study. There are elements and conditions in the one that do not enter into the problems of the other. And so it goes down the whole list. We cannot offer a general solution of the whole fertilizing problem. We will present a few formulas, such as the Orono and Fisher tables that have been very carefully worked out, showing the composition of the different farm manures; also the analysis of farm ashes. These not only show the amount of nitrogen, phosphoric acid, potash, etc., which they contain, but also the amount to be applied per tree, or per acre, together with the price as nearly as can be estimated. We trust that these suggestions may be of value to those who wish to bring their orchards up to a higher state of productiveness.

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Fisher Formula.

The so called "Fisher Formula" is made up as follows:

Nitrate of soda	350 lbs.
Sulphate of ammonia	150 lbs.
Sulphate of potash	230 lbs.
Acid phosphate	220 lbs.
Kieserite	50 lbs.
Giving a mixture of	1,000 lbs.

This formula gives about 8.6% nitrogen; 11.9% phosphoric acid; 3.3% potash. At the present prices this would cost about $49.00 per ton.

By using 10 lbs. to a tree, or 400 lbs. to the acre, it would give about 34.4 lbs. of nitrogen; 47.6 lbs. of phosphoric acid and 13.2 lbs. of potash per acre, at a cost of about $9.80.

Orono Station Formula.

The Orono Station formula as used by Prof. Munson in his orchard experiments in the State is made up as follows:

Nitrate of soda	200 lbs.
Sulphate of ammonia	75 lbs.
Muriate of potash	225 lbs.
Acid rock	500 lbs.
Giving a mixture of	1,000 lbs.

This formula gives about 3% nitrogen; 5½% phosphoric acid; 8% potash. This would give a value of about $25.00 per ton.

By using 10 lbs. to the tree, or 400 lbs. to the acre, this would yield 12 lbs. of nitrogen, 22 lbs. of phosphoric acid and 32 lbs. of potash to the acre at a cost of about $5.00.

ASHES AS A FERTILIZER.

The average analysis of unleached hard wood ashes as given by the Orono Experiment Station gives the following as the amount in pounds from 100 pounds of ashes.

Phosphoric acid	3.3 lbs.
Soluble potash	8.0 lbs.
Lime	36.5 lbs.

For unleached, household, soft wood ashes:

Phosphoric acid	1.8 lbs.
Soluble potash	2.6 lbs.
Lime	23.6 lbs.

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By taking an average of these two analyses we would have:

Phosphoric acid..... 2.55 lbs.
Soluble potash..... 5.30 lbs.
Lime ..... 30.05 lbs.

This would give as near an average farm ashes as we could obtain. By applying one bushel to a tree or one ton to the acre at a value of fifteen cents per bushel, the cost would be $6.00 per acre. This would give about the following per acre:

Phosphoric acid..... 50 lbs.
Potash ..... 106 lbs.
Lime ..... 600 lbs.

Ashes could be used to advantage where the soil needs the extra lime.

FARM MANURES.

The following table showing the composition of the different farm manures was taken from the United States Agricultural Bulletin. The values have been changed so as to correspond with the present prices of the several ingredients.

Animal.	Nitrogen per cent.	Phosphoric Acid. per cent.	Potash per cent.	Value per ton.
1. Cow.	.426	.290	.440	$2.44
2. Horse.	.490	.260	.480	2.71
3. Pig.	.840	.390	.320	4.11
4. Sheep.	.768	.391	.591	4.08
5. Hen.	1.800	1.800	.900	9.90

I have constructed the following table from the above, showing the amount to be used and value of the different farm manures.

Animal.	Amount per acre.	Nitrogen.	Phosphoric Acid.	Potash.	Value per acre.	Amount recommended for application.
1. Cow.	4.8 tons	40.8 lbs.	27.8 lbs.	42.2 lbs.	$11.71	About 10 tons
2. Horse.	4.3 "	42.1 "	22.3 "	41.2 "	11.65	" 9 "
3. Pig.	2.8 "	47.0 "	21.8 "	17.9 "	11.50	" 6 "
4. Sheep.	2.8 "	43.0 "	21.8 "	33.0 "	11.42	" 6 "
5. Hen.	1.2 "	43.2 "	43.2 "	21.6 "	11.88	" 3 "
6. Cow & Horse.	4.5 "	41.4 "	25.0 "	41.7 "	11.68	" 9 "
7. Cow, Horse, & Pig.	4.0 "	43.3 "	23.9 "	33.7 "	11.62	" 8 "

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These figures are computed for first class unleached manure, so I would advise using about double the quantity. This is shown in the last column.

It is generally understood that ordinary farm manure has lost much of its value before it is applied on account of not being properly cared for. In most cases it is thrown out of doors and left to leach, or in case of horse manure, to burn up, and what is left is applied to the land as so much humus. The small per cent of soluble ingredients left go a little way toward orchard renovation.

Good barn manure is without doubt the best general fertilizer that can be applied to the orchard. It not only supplies the required fertilizing elements but improves the physical condition of the soil by the addition of humus, which aids in the retention of moisture, and the warming of cold clay soils. For orchard work the manure should be spread on and plowed under, say four inches deep, and thoroughly cultivated.

In the table on Farm Manure for the convenience of those keeping different farm animals I have added two combinations so as to show the per cents of nitrogen, phosphoric acid and potash found under each condition. A farmer keeping only cows would use No. 1; keeping only horses No. 2; and so on. Where the cow and horse manure are mixed and kept well pitched over use No. 6; and where a lot of hogs are kept on the dressing use No. 7.

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TEST PLOTS.

Divide the orchard up into eight plots as shown by the following outline. Plow and cultivate the whole orchard.

	Cost per acre, $5.00 ORONO STATION FORMULA 400 lbs. to acre 10 lbs. to tree
Cost per acre, $6.00 WOOD ASHES 1 bushel per tree	Cost per acre, $5.00 TANKAGE 240 lbs. to acre 6 lbs. to tree
Cost per acre, $6.00 SULPHATE OF POTASH 220 lbs. to acre 3 lbs. to tree	Cost per acre, $9.80 FISHER FORMULA 400 lbs. to acre 10 lbs. to tree
Cost per acre—See table BARN MANURE Amount—See table	UNTREATED

The above experiment if properly carried out and carefully recorded will give sufficient results to enable any orchardist to decide a course of treatment for his individual orchard. Of

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course it will take several years to accomplish the results sought.

These experiments as given show only the fertilizing treatment of the soil. All other orchard conditions should come in, and each plot should have the best treatment possible under all of the orchard requirements.

If the trees are set two rods apart there would be forty trees to the acre. This is about right for the average orchard. In order to state the amount of fertilizer to be used per acre or under forty trees we will assume that our orchard is at least twenty or thirty years old. A younger orchard would not need so much fertilizer per tree. The fertilizer should be applied evenly under the trees, not nearer than a three foot circle and extending a little beyond the circle of the outer branches.

In the plot marked Tankage I have used an average composition, as the analysis varies with almost every sample taken, on account of the different conditions involved in its production. In the one given the analysis stood,—nitrogen 8.26 and phosphoric acid 8.75. An application of six pounds to a tree would give a sufficient amount of nitrogen. This would not be needed where barn manure was used, as the manure contains sufficient nitrogen.

Potash is considered to be the color agent for fruit, but as much depends upon the season during September and October, as upon any artificial process, although in the long run it seems advisable not to depend entirely upon the chance of having just the right conditions for the best results, but endeavor to help out Nature in her color problems. Some soils may possess enough potash so that any addition will not show results. There is no question as to the value of good hard wood ashes for the orchard.

THE OLD ORCHARD.

How to handle the old orchard is a problem for much thought. There is no doubt but that, in the long run, it would be much more profitable to remove the whole lot and start over again. In the majority of cases the old trees were set too near together and now the tops are twenty or thirty feet from the ground so that the owner has to risk life or limb in the endeavor to procure

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what few apples may be coaxed to grow in such an unfavorable location.

On the other hand, there are hundreds of old orchards in the State that it would pay to try to rejuvenate. A careful and judicious pruning and trimming out of some of the large limbs, top thinning where they are too close to let the sun in, applying a good dressing of barnyard manure and plowing it under in the fall, followed by thorough cultivation in the spring will surely place the orchard in good condition for a test in apple production.

In removing large limbs saw them off two or three feet from the trunk to avoid splitting. Then saw close so as not to leave a projecting stub. In a few days paint over the scar with good white lead. Two or three coats are necessary for thorough protection from the weather. If this is not done the exposed surface will soon begin to decay.

It is better to begin the trimming in the winter. The past fall and winter up to February first has been an ideal one for such work. If knot-holes occur remove any projecting portion of the old limb and close up the opening with a piece of tin; old tomato cans are just the thing. They can be easily unsoldered by placing them for a few moments on a bed of coals in the kitchen stove, then cut to the desired shape with a pair of old shears and tack closely to the opening. If a large opening occurs on the trunk take an old phosphate bag and carefully tack it so as to neatly cover the hole. Paint over in each case the same as mentioned above. This will keep out the rain for a number of years and thus prolong the life of the tree. It would be better to use Portland cement to fill the holes.

If a tree is worth saving it is worth taking care of. If the trunk is covered with rough bark a very profitable investment would be to carefully scrape off all projecting portions and wash the trunk with the whale oil soap solution. This will destroy the hiding places of thousands of enemies and render the tree more vigorous, to say nothing of the looks of the orchard.

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PREPARATION FOR AN ORCHARD.

In making plans for the setting of a young orchard there are many questions to be considered, among which are the following:

Location.

It has been said that any location will do, that it is not so much the location as it is the preparation and care of the soil. In many cases it is best to look the situation over and make the best selection that the farm will allow. If a choice could be made I would suggest the following in the order named, beginning with the most favorable, other conditions being equal. Northwestern; northern; northeastern; eastern; western; southeastern; southern; southwestern. The reason for the above is the protection of the trees from sun scald in the winter, the thawing of the ground and too early starting of the sap in the spring, and the direct hot sun rays in the summer. If on a level, of course there should be sufficient elevation to afford good drainage, as this is one of the most essential requisites of a good orchard location. Gentle slopes are much to be preferred to steeper inclines or abrupt hillsides. If natural drainage does not exist artificial should be resorted to, as trees like human beings, cannot thrive with cold feet.

Heavy clay soil gives smaller fruit and not so well colored, the flavor not reaching the high standard that is produced on a light warm soil.

START A NURSERY.

It would be a good plan to arrange to start a nursery in the spring or next fall, if not ready now. The seeds can be sown in drills in good garden soil and the young trees cared for by simply thinning out and keeping the weeds down just as you would care for a garden. In the spring of the second year transplant into rows three feet apart, the trees about eight inches apart, and care for them through the season, cultivating up to August first, and then applying a mulch of straw to allow them to harden up for winter. As soon as the leaves have fallen clean off all of the straw so the ground will freeze. The greatest danger to the young nursery trees is the presence of mice during the winter. Be sure that the trees are not set

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near the edge of the field so that mice could be harbored in the grass and weeds along the sides of the fence.

It might be well to protect the trees from deep snows in winter by driving stakes along the rows and tacking on some boards to hold the snow in spring from breaking down the trees. The boards would want to be up from the ground so as not to harbor mice. These should be removed in the spring and replaced the next fall. Cultivation should be kept up for two years at least and a fertilizer should be applied each year so as to keep up a good growth of the trees. By the third spring the trees would be large enough to graft. This should be done where they stand. They should then remain two years in the nursery before transplanting to the orchard site.

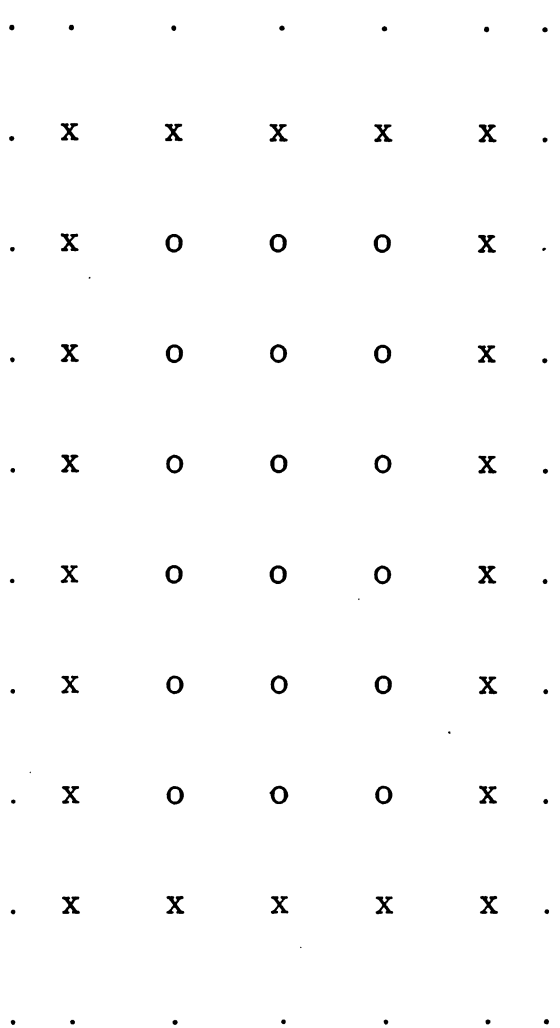
TRANSPLANTING.

The spring that the trees are grafted in the nursery is the time to start the orchard site, or better break up the land the fall before, after having applied a good coating of barn manure. In the spring prepare the ground thoroughly for planting; corn would be better, but potatoes can be put in. By using high-grade potato phosphate at the rate of one ton to the acre, the land will be in good condition for the next year. The second spring fertilize well and plant corn. This prepares the ground for the setting of the new orchard the following spring.

Mark off the ground by setting stakes (bean poles are good), in a straight line at intervals of two rods apart along one edge, one rod in from the edge as shown by the cut. Then set stakes in the same way across one end, down the other side, and across the remaining end. Then by sighting across each way three persons can set the poles in a short time so they will all line up in perfect squares. It takes two to sight across and one to set the stakes.

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PLANS FOR SETTING YOUNG ORCHARD.



This may seem to be taking too much trouble but if done it will never be regretted. Remember the orchard is being planned for years to come and not for a season or two. If these suggestions are followed one will never grow cross-eyed in looking at the orchard in after years. In whatever direction one looks through the orchard, the trees will be in straight

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rows and can be cultivated in any direction. The trees should be set where the stakes are placed, in blocks, each variety by itself.

GRAFTING.

We would use the form called cleft grafting in all cases, not only in nursery stock but also in top working. We know that this statement opens the way for quite a discussion among orchardists. The form called budding is practiced by many; splice grafting by others. We have our opinion, you have yours, follow whichever you like, but graft you must. There is no question but that the best results are secured when the scions are set in stock not over one inch in diameter.

It seems unnecessary to go into detail in regard to the different ways of grafting as these have been described so many times in our farm papers, Station bulletins and Government reports. For a commercial orchard select scions from only a few varieties and be sure that these are taken from trees that have established a good record for first-class fruit. We cannot too firmly impress this fact. A fair test will convince any candid person that there is a very wide difference in the same variety of apples taken from trees growing under different conditions or whose scions were taken from different stock.

Do not put off grafting until too late in the spring. Many graft after the trees have blossomed. Better results will be secured if the grafting is done before the buds start. This will give the scion a chance to start with the rest of the tree, and allow it to finish its growth in the fall. In grafting young trees in the nursery, cut the stock about two feet from the ground and set the scions. When these have grown to be about a foot or fifteen inches in length cut off the end so that lateral buds will start to form the main branches. Each apple grower has his own preference for varieties. We will mention a few among the leading commercial varieties: Baldwin, Rhode Island Greening, Ben Davis, Spy, King, Roxbury.

For home consumption we would have one tree each of the following: Red Astrachan, Williams, Gravenstein, Fameuse, McIntosh, Yellow Bellflower, Nodhead, Tolman Sweet.

These could be set near the house in a home garden with small fruits. Each family should have enough blackberry, rasp-

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berry, currant and gooseberry bushes, and strawberry plants, also plum and pear trees, to supply the household through the year with their essentials to good health.

PRUNING.

The great secret of success in young orchard growing, is to have a definite form of tree in mind and to aim to reach that ideal by a systematic plan of pruning. Trees should be started with a low head, say three, or at the most four feet from the ground. Cut to three or four branches, preferably three at first, with the tips of these cut back, allowing lateral branches to start for the next year's growth so as not to induce a growth of long ungainly branches. Aim to have a not too compact head so that the sun will have a good chance to get at all of the foliage. The amount and nature of the pruning will depend in a great measure on the variety of tree, as some varieties tend to spread, like the Wealthy and King, and others to grow upright, like the Spy.

The orchard needs constant care in this respect and should be gone over at least once a year. This should be done in the late winter or early spring before the buds begin to swell. Do not allow limbs to get too large before trimming as it leaves a large scar. The larger the scar the longer it will be in healing. With young trees care should be taken to prune terminal shoots that have a tendency to reach too far out.

For pruning old trees see section under "The Old Orchard," page 288.

COVER CROP.

A cover crop should be sown by the middle of July or first of August. Clover is one of the best cover crops, as its roots penetrate deep into the soil to conserve moisture and to store up nitrogen. A series of experiments were conducted at one of our State Stations. An orchard was sown about the middle of July to red clover. An analysis taken in October gave 87 pounds of nitrogen per acre as stored up by the clover.

Sow from twelve to fifteen pounds of red clover to the acre the last of July or as soon after haying as convenient. If the ground is so rich that too rank a growth is secured, mow the

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clover just before picking and let it remain on the ground. Plow this under early the following spring.

Buckwheat is recommended by many for a cover crop. This should be sown in July. If rye is used do not sow until later; last of August or first of September.

The cover crop serves as a mulch for the ground, to retain moisture, and as a source of nitrogen supply in case of clover.

MULCHING.

One of the essentials to a good crop of apples is the application of a good mulch around the trees. This should be put on just after haying. Swale hay or any poor quality of refuse straw or hay is just what is needed for this purpose. A good liberal quantity should be applied.

THINNING APPLES.

There are many benefits to be derived from the thinning of the fruit on trees that set a heavy crop of apples. One year of overbearing may cause an irreparable damage to the tree. The amount of energy that a tree has to put forth during the last few weeks of the development of the fruit is beyond computation. No wonder the fruiting period comes but once in two years, with many varieties. The circulation of the sap is much like that of the blood in the human body. The crude sap as it passes up the tree from the roots must go to the leaves to be elaborated into the life giving elements that combine to form the new growth of the tree itself. To this regular work comes the added strain of seed and fruit production. If the tree cannot have a sufficient supply of the elements necessary for this extra work it will fail to stand the strain and the result will be the weakening of the whole structure. By a judicious thinning of the fruit this extra strain on the tree's resources will be regulated so as to prevent disaster to the tree. Another benefit to be derived would be in securing a better quality. The size of the apple would be increased, and the color would be improved. It stands to reason that if a tree, which is heavily loaded with fruit, has one-fourth of the apples removed by the first of July, it will yield a much better crop as far as color, size and flavor are concerned, than if it had carried the whole crop. If there is a question regarding the above statement, instead of

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wasting time and energy in the discussion of the subject, take the time to try the experiment.

When a too heavy crop is set, the fruit should be thinned to at least one apple to a cluster, or if the clusters are near together leave the apples not nearer than four or six inches of each other, depending on the variety.

The thinning should be done by hand when the fruit is not over one inch in diameter, or perhaps a month after the apples have set. Remove all small or deformed fruit leaving only the best to grow. The time required for this extra work added to the time employed in the fall picking would be some greater than it would be to let the whole remain and pick the total crop in the fall. The yield of the thinned fruit would not be as great in number of barrels but it would contain more number one apples, and that is the prize to be aimed at.

APPLE STORAGE.

There is no doubt but that cold storage for our apples has come to be a necessity if we would get the best returns from our orchard.

If the crop must be unloaded in the fall, of course it means a glut in the market on an apple year. There are generally enough early fall apples to furnish the market at that time, so that provision must be made by the orchardist to hold his winter supply until there is a demand for them. By proper care and sufficient knowledge of the business it is possible to hold the crop by means of cold storage so as to have a supply of this favorite fruit during the whole year, and thus secure a good price for the product.

KEEPING QUALITIES.

There are many conditions to be considered in the problem of packing apples for cold storage. It has been stated that apples grown on sod land will keep better and show a better color than when under cultivation. This may be so in some instances but not as a rule, for color may be regulated to a certain extent by chemicals. There may be a difference in flavor but the extra size in tilled fruit will more than make up the balance. The same is true of apples grown on a light loam as compared with those grown on a heavy soil. All other con-

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ditions being equal apples will keep better when the season has been a dry one as compared with a wet one.

HANDLING.

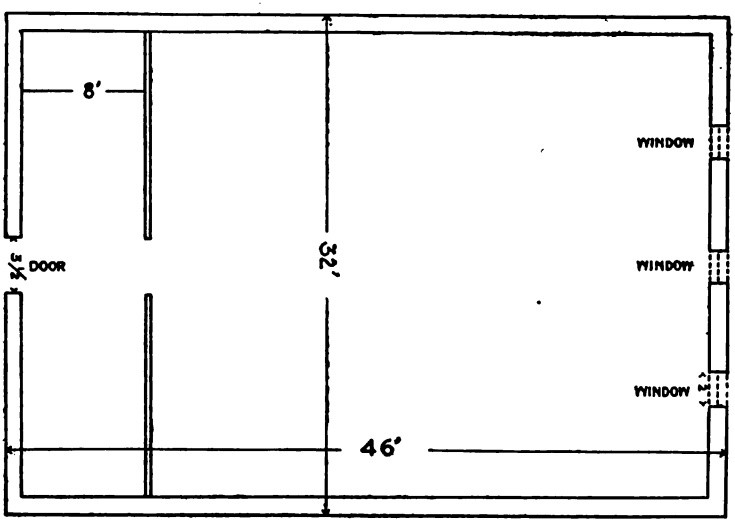
The careful handling of fruit at the time of picking and packing is of the utmost importance to its keeping qualities and market value. Some varieties are very easily bruised and need to be handled with the greatest of care.

COLD STORAGE.

We would strongly recommend that every orchardist make arrangements for a more desirable cold storage than the ordinary farm-house cellar where all kinds of vegetables, including potatoes, are stored. The apple is too sensitive to odors to be confined in a cellar where potatoes are kept. If no building is available that would be suitable to remodel for this purpose it might be a profitable investment to construct one. Several of our correspondents have spoken very favorably of the idea of cold storage buildings, one especially recommending construction of a general cold storage plant at some central point.

GROUND PLAN FOR COLD STORAGE.

We have drawn a plan simply as a suggestion regarding the construction of a building for this purpose.



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The ground plan shows a building 46 by 32 feet, outside measurements, giving a storing and packing room 8 by 30 feet and a storage room of 36 by 30 feet with a capacity of about 800 barrels, provided the barrels are set three tiers deep.

We would recommend placing this building on a concrete foundation with a floor of the same material making it rat-proof. Have a wall space of one foot filled with sawdust. Board up on outside, and shingle or clapboard with sheathing paper between. Sheath up on inside with good matched boards. Leave spaces at back end for three windows, these to have three sashes to each window. Have good double doors in front and a single sliding door in the partition.

For ventilation have openings on each side just under the eaves so arranged as to close up securely on outside and inside. The floor overhead should be of matched boards above and below, at least six inches apart, filled in with sawdust.

PRINCIPAL INSECTS OF THE ORCHARD.

INFESTING THE ROOTS.

Woolly aphis, *Schizoneura lanigera.* This insect leads a dual life, existing on the roots, producing gall-like enlargements or swellings, also on the trunks of small trees especially around the scar where limbs have been pruned or in the small crotches of the branches. For a further description I will quote from my annual report of 1906.

"They are small reddish-brown lice, and as generally seen, are covered with a long white woolly substance. These appear in patches on the limbs of the trees, often resembling mildew in general appearance. They also live in colonies on the roots of the same tree where they form gall-like swellings of varying sizes as shown in Fig. 15. They are much more destructive when found on the roots as they sap the life of the tree directly from its source.

The insect passes the winter either in the egg form in crevices in the bark of the trunk, or in the adult stage in the gall-like formations on the roots.

In the spring the eggs hatch producing the agamic female and these give birth to living young as do those of the San Jose scale. This continues through the summer when the winged form appears. These fly to other trees and produce male and

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female lice; the females of these lay eggs from which the new generation starts the following spring.

The lice generally congregate around the scar produced by the pruning of a limb or where an injury has occurred to the bark."

All trees purchased from a nursery out of the State should be thoroughly examined for the above described appearance.

The best remedy for those on the trunk and limbs is a ten per cent solution of kerosene oil, or thoroughly wash with a solution of whale oil soap, using one pound of soap to five gallons of water. Cut the soap thin and dissolve in hot water, then add enough cold water to make the required quantity.

It has been recommended to dip the roots in hot water before setting. After the tree is set watch it carefully through the

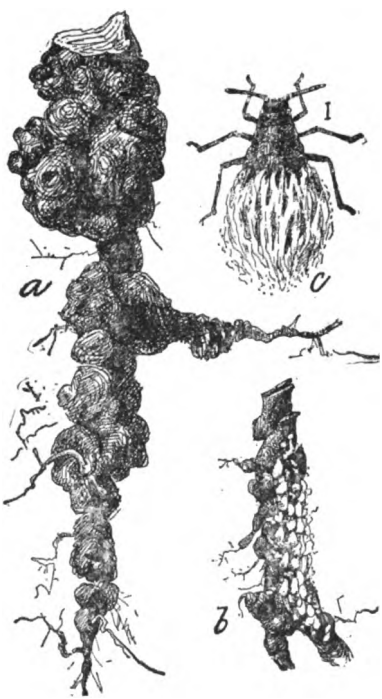


FIG. 15. *Schizoneura lanigera;* a, b work on roots; c, a louse. (Marlatt. Bulletin, 34, Div. of Entomology, U. S. Dept. of Agri.).

season to see if any of the inescts appear; if they do, the best way is to pull the tree up and set a plum or pear tree in its

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place, as the aphis on the roots would be likely to inoculate the ground, and it wouldn't do to set another apple tree in the same place. The insect couldn't live on a plant or pear tree.

INFESTING TRUNK AND BRANCHES.

Round-headed apple borer, *Saperda candida.* This is a light gray beetle about one inch long with a white stripe on each wing cover. See Fig. 16. The female generally appears in July, although I have found them on the apple trees as late as



FIG. 16. Round-headed Apple borer, *Saperda candida.* Life size. (Hitchings.)

August 17th. They usually lay their eggs around the trunk of the young trees just above the ground. These soon hatch into minute grub-like borers that work their way into the tender bark. Here they feed and burrow for the first season; the next year they work their way into the wood, sometimes girdling the tree and causing its death. They reach their growth the second year and appear again as perfect beetles ready to lay their eggs for another generation.

A young orchard should be carefully watched for the first appearance of these pests. Their presence can be determined by examining the trunks just above the ground. This should be done several times during the summer. If fine patches of what seems to be sawdust are found in little bunches around the trunk, carefully hunt for the intruder and if found it can be destroyed with the point of a sharp knife without injuring the tree.



FIG. 17.—Flat-headed Apple borer, *Chrysobothris femorata.* Life-size. (Hitchings.)

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Flat-headed apple borer, *Chrysobothris femorata.* Fig. 17. This borer is more apt to be found where an injury occurs in the bark or where it has been winter-killed. They are liable to be found on almost any part of the tree, where the above conditions prevail. If the trees are examined each year and properly cared for there is no special danger from these insects.

INFESTING THE BARK.

Bark lice. Of the different species of bark lice infesting the apple trees of Maine, the oyster-shell, *Lepidosaphes ulmi,* is by far the worst pest of its kind we have to contend with. As the life history of this insect was given in my last annual report we will give only a brief summary of its treatment.

The young hatch from the eggs, which have remained under the scales during the winter, about the middle of June or later, depending on the season, and in a short time become fixed, a new scale forming over them. They can be easily detected if the trees are carefully examined. They will be seen as minute specks moving quickly about on the trunk and branches.

They can be easily destroyed by thoroughly washing the trees during the fall, winter, or spring with whale oil soap solution, or spraying the trees at the time the young hatch out, before they get fixed on the tree, with kerosene emulsion.

San Jose scale, *Aspidiotus perniciosus.* We are so anxious regarding this scale that we wish to say a word in relation to it.

In my report of last year I gave a complete life history, fully illustrated, of this pest. We urge every orchardist of the State to send in to the department any questionable scale or insect found working on or in their orchard. It would be a great calamity indeed should this insect gain a foothold in the State.

INFESTING THE BUDS.

Bud moth, *Tmetocera ocellana.* This little orchard pest is very common all over the State. The caterpillars spin fine silken threads to draw the small leaves together around the blossoms. They destroy many of the fruit buds and later the young fruit. They reach their growth about the middle of June or later, then change to the pupa stage and hatch into the moth.

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The eggs are laid in July. The caterpillars hibernate through the winter and complete their growth in the spring.

There are several species of climbing cut-worms that do a great deal of damage. They climb the trees in the night and cut off the buds.

INFESTING THE LEAVES.

There are several species of very small moths whose larvæ feed on the leaves and buds of the apple. The most common of these are the following:

Apple-leaf Bucculatrix, *Bucculatrix pomifoliella.* This is a very common insect in some sections of the State. The larvæ have no protection like the leaf rollers, but feed on the leaves and have the power of spinning the fine threads the same as the others, but these are for letting themselves to the ground. As soon as they reach maturity they spin little silken cocoons and attach them to the small twigs.

These cocoons remain on the tree through the winter and may be killed with the whale oil soap solution. I have seen them in abundance in some orchards. Specimens have been sent into the office for identification.

There are several species called leaf rollers, which do a great deal of damage.

The banded leaf roller, *Archips rosceana,* is perhaps the most common. All these tiny caterpillars have the power of secreting silken threads with which they sew up the leaves. This species draw the young leaves around the blossom bud cluster and feed within this enclosure similar to the preceding species. The caterpillars are very active when disturbed and often wriggle out and drop to the ground. They vary in color from a greenish yellow to shades of brown. The larvæ do up and change to the pupa and hatch out into a light brown moth with darker bands across the wings.

The leaf roller, *Ancylis nubeculana,* is another common species. The young caterpillars do not appear until about the first of July. They sew up the edges of the leaves with silk threads; this is their house in which they feed. When the leaves fall these caterpillars remain in them through the winter and the moth hatches out in the spring ready to lay her eggs.

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If the leaves were raked up and burned many of them would be destroyed.

The green apple louse, *Aphis pomi.* This insect does considerable damage to the tender growth of young trees, especially in the nursery. These should be sprayed as soon as their presence is noticed, with kerosene emulsion. It would be better to examine the young shoots before they leave out in the spring. If small shiny black specks are found this would indicate the presence of the lice, as these are the eggs. Spray as soon as these hatch out and they are easily destroyed, but if the spraying is neglected until the leaves are all curled up it is almost impossible to destroy them, as they are all inside the curled up portion.

OTHER LEAF INSECTS.

Among the other leaf insects are the following:

Forest tent-caterpillar, apple tent-caterpillar, brown-tail moth, gipsy moth, red-humped caterpillar, old and white-marked tussocks, yellow-neck caterpillar, canker worms, fall web-worm and many others too numerous to mention. The most destructive of the above named insects at the present time is the red-humped caterpillar. Especially is this true in the nursery and young orchard.

The caterpillars hatch from the eggs and remain congregated together as they feed, at first merely skeletonizing the leaves. They develop very rapidly, eating the leaves as they grow so that in a short time a small tree would be entirely stripped. This is generally done while the orchardist is busy haying and the injury is not apparent until the tree is destroyed. A careful watch should be kept on the orchard and as soon as the young are detected the leaves should be removed and the caterpillars destroyed.

For tent-caterpillar collect egg-clusters during winter or spring. Destroy nests by burning.

It would be well to burlap trees through the season, as many of the above named caterpillars would be captured, including the codling moth larvæ. Take old short sacks and cut up into strips eight inches wide; put a strip around the trunk of the tree and fasten with a string around the center of the burlap, then fold down the upper half. This will serve as a hiding

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place for the larvæ. Visit them every few days and kill the caterpillars.

INFESTING THE FRUIT.

Codling moth, *Carpocapsa pomonella.* This is by far the worst insect enemy of the apple, causing a loss of many millions of dollars each year.

LIFE HISTORY.

The moth appears about the middle of June and deposits her eggs on the leaves and fruit. In from ten days to two weeks the eggs hatch and the minute larvæ begin feeding on the leaves and fruit, especially where a leaf touches the fruit. This is the time to spray as the young larvæ are easily destroyed by the Paris green of the solution.

If left to develop they gradually work their way into the apple and after reaching maturity in the fall, crawl out and seek a sheltered place in which to pupate. This may be under the hoops of the barrel, under bark on the tree or some other convenient place. Here they spin a silken cocoon and remain until another spring when they hatch into the adult moth.

Railroad worm, *Rhagoletis pomonella.* The mature insect is a small fly about one-half the size of the common house fly. She punctures the skin of the apple with her ovipositer and lays her eggs underneath, so that spraying is ineffective. Keep the ground free from all apples as soon as they fall. The larvæ enter the ground to pupate and remain over winter.

FUNGOUS DISEASES.

Apple scab, *Fusicladium dendriticum.* A brief history of the disease called apple scab may not be out of place.

The spores or "seeds" are very minute microscopic bodies, so light as to be easily blown about in the air. These lodge in the leaves and embryo buds during the late fall ready for the next year's "seeding."

In the early spring when the buds start the mycelium or "roots," force their way under the scale of the buds and begin their growth. The ripened spores are conveyed to the apple and developed leaves and form the scab-like growth on the fruit and leaves. This process is hastened by moisture and heat. An

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orchard that is kept pruned each year so that the sunlight can get to all parts of the tree will be more likely to resist the attack, although the spores might be present.

For apple scab use Bordeaux mixture, first just before the buds start, second after the petals fall, third ten days or two weeks later, fourth in about the same time. In a dry season there is not much trouble with scab. In a wet season several sprayings may have to follow.

Some apples appear to be immune from the scab. Others such as the Fameuse, Milding, McIntosh Red, etc., are very susceptible to the disease.

Bitter-rot, *Gloeosporium fructigenum,* is a very serious apple disease, standing next to the scab in importance. It appears first as minute brown spots increasing in size as they mature. The spots have a very bitter taste. The disease sometimes causes much injury in fruit after it is packed, especially if the apples have not been well sorted.

Apple canker, *Nectria ditissima,* is a parasitic growth affecting the bark of the trees, causing the death of the tissues. This gradually spreads, the bark disintegrating and falling away, and in time causes the wood to crack and decay, and eventually the death of the tree.

For canker cut out and scrape clean, being sure to remove all dark colored portions of the live bark. Burn all of the material removed. Paint over with copper sulphate, one pound to twenty-five gallons of water. When dry apply a good coat of white paint, followed by a second coat when the first has thoroughly dried.

Rust caused by cedars, bitter-rot, and leaf-blight may be controlled with Bordeaux mixture.

FUNGICIDE.

Bordeaux Mixture—There have been so many experiments conducted with the different strengths of this mixture it seems wholly unnecessary to go into detail here. It is generally conceded that the value of spraying varies with the weather conditions at the time of the application more than in the strength of the solution. In all conditions I think I would recommend the 3-3-50 formula as being the safest in the long run. Under

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ordinary conditions this is strong enough to kill the spores without the risk of injuring the leaves or fruit. That means three pounds copper sulphate, three pounds lime, and fifty gallons of water. If there is any injury apparent after spraying, such as the turning dark of the edges of the leaves, especially at the tips, and a russeting of the fruit, carefully investigate the process of making the mixture and see that every precaution is taken.

The lime should be thoroughly slaked and the copper sulphate thoroughly dissolved and strained before combining the two. Then add enough water to make fifty gallons. An excess of lime is not detrimental.

From a series of experiments tried at the N. Y. Experiment Station on the effect of the different per cents of copper sulphate in Bordeaux mixture, to prevent the injury to the fruit due to that fungicide, it was suggested that the formula should be the 3-3-50 one as showing the least cause for injury.

INSECTICIDE.

As an insecticide add one-fourth pound of Paris green to the fifty gallon solution of Bordeaux mixture.

ACKNOWLEDGMENTS.

We are greatly indebted to Dr. L. O. Howard, Washington, D. C., C. W. Johnson, Boston N. H. Society, Dr. J. B. Smith, Brunswick, N. J., W. D. Kearfott, Montclair, N. J., and Frederick Blanchard, Tyngsboro, Mass., for identification of specimens; to D. M. Rogers, National Field Agent, Prof. A. H. Kirkland, Supt. of Mass. Commission; to the Press of the State; to the officers of the State and County Fairs; the State Board of Trade; the State Grange; the State Pomological Society; and to the many friends who have extended courtesies in rendering assistance in advancing the efficiency of the work in the State.

E. F. HITCHINGS,
State Entomologist.

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EXTRACTS FROM CATTLE COMMISSIONERS' REPORT.

During the year there have been condemned and destroyed by the commissioners 802 cattle, 68 horses, and 56 sheep. Average cost of cattle and horses (including cost of condemnation, disinfection, testing pure bloods and all other expenses) $37.33; owner received per animal, $25.02; average cost to condemn and disinfect, etc., $12.31.

During the year there have been condemned and destroyed at Brighton, Mass., under the law of 1907, 40 cattle for which the commissioners have paid, amounting to $995.00.

A summary of the report shows that the amount paid for cattle, horses and expenses during the year 1907 was $25,346.95. The amount due Dec. 1, 1907, was $7,132.15. Total amount of business done, $32,479.10.

The report of 1905 and 1906 showed, out of the number of grade cattle tested with tuberculin, 6% were diseased; out of the number of pure bloods tested with tuberculin, 20% were diseased.

During the year 1907 there were tested with tuberculin (including both grades and pure bloods) 20,000 head, and 802 were condemned, or 4% diseased. This shows a large reduction from the last report, which is gratifying to the commissioners, and no doubt will be to the dairymen of the state.

There were over 9,000 cattle sold in Brighton during the year 1907, and Mass. demands that all cows offered for sale for milking purposes shall be submitted to the tuberculin test, and only 40 were reported back to the Maine commissioners.

Our law does not give the cattle commissioners any control over sanitary conditions, except where contagious disease is found.

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We wish to draw your attention to the item in the report as to the average cost of condemning cattle, $12.31 each. This means the testing of pure bloods, whether diseased or not, grade cattle that were found diseased, suspicious cases attended to and found not to be diseased, disinfecting premises where disease was found, travelling expenses, office expenses, cattle commissioners' salaries, and expense of every name and nature except the actual money paid to the owner of the animal. It is the average expense upon each animal.

It was hard to separate the expense of disinfection from other expense, but it is safe to say that one-third of the total expense was for that purpose, as where the tie-up was found to be unsuitable for disinfection, the commissioners would recommend the removal of the old and dilapidated and the building of new and smooth work, and would allow the party from $5 to $25 to encourage him to do the work and have a more modern and better ventilated tie-up, and in adopting this new rule we have increased our expense per animal 17c. each from the last report.

Maine is expending a large amount of money yearly to foster and protect its dairy interests, and it is well equipped with different departments to carry on the different lines of work.

First we have a Commissioner of Agriculture, then we have a Dairy Instructor, a Board of Cattle Commissioners and all working along different lines, but in harmony with one another.

Then we have a Dairy Association with a large membership consisting of the leading dairymen of the state, and the heads of the different departments are willing and ready at all times to carry out the suggestions and the sentiments of the Association as far as the law will permit, and I think I voice the sentiment of the Dairy Association when I say that they want better herds, better sanitary conditions, better cream, better butter and healthy herds. The demand for our products and the prices that they command indicate that conditions are growing better all along the line.

JOHN M. DEERING, *Secretary.*

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STATISTICS OF AGRICULTURAL SOCIETIES.

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OFFICERS OF AGRICULTURAL SOCIETIES.

Name of Society.	President.	P. O. Address.	Secretary.	P. O. Address.	Treasurer.	P. O. Address.
Maine State Agricultural	B. J. Libby	Oakland	J. L. Lowell	Auburn	E. G. Eveleth	Auburn.
Eastern Maine Fair Association	F. O. Beal	Bangor	E. L. Sterns	Bangor	A. S. Field	Bangor.
Central Maine Fair Association	E. P. Mayo	Waterville	Geo. R. Fuller	Waterville	Martin Blaisdell	Waterville.
Maine State Pomological	Wm. Craig	Auburn	W. J. Ricker	Turner	E. L. Lincoln	Wayne.
Maine State Poultry and Pet Stock Association	Silas Bartlett	Lewiston	A. L. Merrill	Auburn	T. H. Sclater	Auburn.
Androscoggin County	J. L. Cummings	Livermore	J. L. Lowell	Auburn	H. A. Morison	Livermore Falls.
Aroostook, Northern Maine Fair Association	A. E. Irving	Presque Isle	Ernest T. McGlauflin	Presque Isle	A. E. Irving	Presque Isle.
Cumberland County	J. L. Robinson	So. Windham	C. H. Leighton	Cumberland Mills	F. D. Scammon	Gorham.
Cumberland Farmers' Club	M. M. Burnham	Cumberland Center	E. W. Winslow	Woodfords, R. F. D. 2	N. M. Shaw	Cumberland Center.
Cumberland, Bridgton Farmers' and Mechanics' Club	F. F. Emery	Bridgton	C. Lester Ames	Bridgton	J. S. Ames	Bridgton.
Cumberland, New Gloucester and Danville	John W. True	New Gloucester	J. P. Witham	New Gloucester	Geo. W. Haskell	New Gloucester.
Cumberland, Freeport Agricultural Society	Ralph Merrill	Freeport	Willis Snow	Freeport	S. F. Fitts	Freeport.
Cumberland, Freeport Poultry Association	V. C. Morton	Freeport	Geo. P. Coffin	Freeport	L. E. Curtis	Freeport.
Franklin County	R. S. Sampson	Temple	Chas. F. Smith	Farmington	Geo. M. Currier	Farmington.
Franklin, North	D. D. Graffam	Phillips	D. R. Ross	Phillips	C. N. French	Phillips.
Hancock County	F. P. Merrill	Bluehill	C. S. Snowman	Bluehill	M. P. Hinckley	Bluehill.
Hancock, North	A. D. Archer	Clifton	A. N. Jewett	Amherst	J. H. Patten	Amherst.
Hancock, Eden	C. F. King	Eden	Ephraim Alley	Salisbury Cove	W. L. Alley	Eden.
Hancock, North Ellsworth Farmers' Club	Francis McGown	Ellsworth, R. F. D. 3	H.Fremont Maddocks	Ellsworth, R. F. D. 3	Alvin E. Maddocks	Nicolin.
Kennebec County	Fred I. Brown	Readfield	E. E. Peacock	Readfield	Chas. H. Stevens	Readfield.
Kennebec, South	L. A. Howe	Augusta, R. F. D. 2	Arthur N. Douglas	Gardiner, R. F. D. 9	J. S. Gray	Windsorville.
Knox, North	H. B. Bowes	Union	George C. Hawes	South Union	H. L. Grinnell	Union.
Lincoln County	C. E. Peaslee	Alna	A. L. Shaw	Damariscotta	E. F. Metcalf	Damariscotta.
Lincoln, Bristol	J. W. P. Goudy	Bristol	J. Wilbur Hunter	Damariscotta	C. B. Woodward	Damariscotta.
Oxford County	Wm. J. Wheeler	So. Paris	W. O. Frothingham	So. Paris	W. O. Frothingham	So. Paris.
Oxford, West	Wm. Gordon	Fryeburg	B. Walker McKeen	Fryeburg	W. R. Tarbox	Fryeburg.
Oxford, North	Chas. T. Poor	Andover	J. F. Talbot	Andover	S. F. Abbott	Andover.
Oxford, Androscoggin Valley	A. L. Stanwood	Rumford Falls	O. M. Richardson	Canton	T. B. W. Stetson	E. Sumner.
Oxford, Riverside Park Association	J. A. Twaddle	Bethel	W. B. Twaddle	Bethel	W. B. Twaddle	Bethel.
Penobscot, West	C. L. Jones	Corinna	E. E. Colbath	Exeter	F. C. Barker	Exeter.
Penobscot, North	S. T. Mallett	Springfield	B. D. Averill	Prentiss	C. M. Lombard	Springfield.

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Piscataquis County	E. T. Monroe	Foxcroft	E. C. McKechnie	Foxcroft	A. J. McNaughton	Foxcroft.
Sagadahoc County	Lewis M. Fulton	Bowdoinham	Geo. R. Tedford	Topsham	Lyman E. Smith	Brunswick.
Sagadahoc, Richmond Farmers' and Mechanics' Club	Geo. M. Curtis	Richmond	H. E. Alexander	Richmond	H. E. Alexander	Richmond.
Somerset County	Ernest Hilton	Anson	J. F. Wilbee	Madison	E. H. Abbarn	Anson.
Somerset, East	Lewis Fish	Hartland	E. A. Webber	Hartland	F. S. Burrill	Hartland.
Somerset, Central	C. Davis Miller	Skowhegan	Ansel Holway	Skowhegan	Elwin D. Packard	Skowhegan.
Somerset, Bingham	George Gordon	Bingham	H. B. Whipple	Bingham	Granville Goodrich	Bingham.
Waldo County	Horace Chenery	Belfast	Ralph Morse	Belfast	William A. Mason	Belfast.
Waldo and Penobscot	W. B. F. Twombly	Monroe	Edwin Jenkins	Monroe	E. C. Newcomb	Hampden Cor., R.F.D. [1]
Waldo, Unity Park Association	Wm. H. Kimball	Burnham	E. T. Reynolds	Unity	E. T. Reynolds	Unity.
Washington, West	A. H. Chandler	Columbia Falls	S. H. Allen	Columbia Falls	W. H. Allen	Columbia Falls.
Washington, Central	E. T. White	Machias	W. H. Phinney	Machias	M. Gardner	Machias.
York, Shapleigh and Acton	Andrew J. Lord	Acton	Fred K. Bodwell	Acton	George T. Crediford	Shapleigh.
York, Cornish Agricultural Association	W. H. Pemberton	Cornish	Wm. R. Copp	Cornish	Chas. Bradeen	Cornish.

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ANALYSIS OF EXHIBITION.

Name of Society.	Number of horses and colts.	Number of thoroughbred bulls and bull calves.	Number of thoroughbred cows, heifers and heifer calves.	Number of grade cows, heifers and heifer calves.	Number of oxen and steers.	Number of animals for beef.	Number of cattle shown in herds.	Total number of neat stock.	Number of sheep.	Number of swine.	Number of poultry, (coops).
Maine State Poultry and Pet Stock Association	-	-	-	-	-	-	-	-	-	-	-
Androscoggin County	60	8	18	20	38	6	12	82	10	14	28
Aroostook, Northern Maine Fair Association	114	25	68	26	12	-	12	131	67	22	129
Cumberland County	120	40	54	28	180	10	-	312	35	42	79
Cumberland Farmers' Club	24	12	33	48	52	6	32	145	-	8	134
Cumberland, Bridgton Farmers' and Mechanics' Club	36	7	32	25	40	6	16	126	24	13	45
Cumberland, New Gloucester and Danville	29	2	5	8	6	-	-	21	-	16	27
Cumberland, Freeport Agricultural Society	22	3	10	15	-	-	-	28	9	23	60
Cumberland, Freeport Poultry Association	-	-	-	-	-	-	-	-	-	-	691
Franklin County	123	33	72	70	322	20	104	621	260	13	89
Franklin North	78	4	14	27	108	10	18	181	64	7	3
Hancock County	15	10	12	25	40	25	-	112	20	10	10
Hancock, North	18	1	-	12	6	-	-	19	9	-	10
Hancock, Eden	5	2	5	10	2	-	10	29	8	-	16
Hancock, North Ellsworth Farmers' Club	4	3	10	14	2	-	-	29	-	-	5
Kennebec County	53	19	55	27	80	12	44	237	23	42	175
Kennebec, South	40	7	5	45	138	9	15	219	13	20	8
Knox, North	29	6	17	17	92	8	31	109	6	2	30
Lincoln County	34	6	16	6	32	7	14	81	-	-	22
Lincoln, Bristol	9	-	-	8	22	7	-	30	9	-	12
Oxford County	47	31	74	105	122	10	36	378	101	9	68
Oxford, West	70	6	50	20	100	14	25	215	28	16	40
Oxford, North	18	1	4	24	37	12	12	78	21	2	19
Oxford, Androscoggin Valley	34	15	37	12	156	10	8	238	-	9	64

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Oxford, Riverside Park Association	27	12	39	47	46	19	25	141	42	16	11
Penobscot, West	51	10	46	46	24	1	42	160	42	5	32
Penobscot, North	50	- 10	-	-	-	-	-	-	24	-	12
Piscataquis County	50	-	-	-	- 8	-	60	117	4	-	19
Sagadahoc County	65	40	98	102	114	18	60	354	35	78	270
Sagadahoc, Richmond Farmers' and Mechanics' Club	12	- 7	6	20	10	2	17	36	6	6	11
Somerset County	47	2	13	34	66	23	12	155	98	- 10	60
Somerset, East	48	10	6	28	10	4	25	75	25	24	18
Somerset, Central	67	2	43	34	52	-	-	139	93	12	250
Somerset, Bingham	19	- 9	3	13	-	-	-	18	6	-	-
Waldo County	- 75	9	- 64	- 79	108	52	59	- 371	- 27	4	15
Waldo and Penobscot	40	6	14	16	26	12	22	96	13	9	3
Waldo, Unity Park Association	38	17	30	39	32	- 1	-	118	74	25	48
Washington, West	25	2	7	12	4	-	-	26	8	7	34
Washington, Central	7	- 11	- 27	6	70	6	-	82	5	1	19
York, Shapleigh and Acton	23			25	130	8	16	217	20	7	41
York, Cornish Agricultural Association	1626	369	1036	1093	2287	318	727	5535	1229	472	2607

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ANALYSIS OF AWARDS.

Name of Society.	Amount of premiums awarded trotting bred stallions.	Amount of premiums awarded trotting bred brood mares.	Amount of premiums awarded draft stock stallions.	Amount of premiums awarded draft stock brood mares.	Amount of premiums awarded family horses.	Amount of premiums awarded gentlemen's drivers.	Amount of premiums awarded matched carriage horses.	Amount of premiums awarded colts.	Amount of premiums awarded horses for draft.
Maine State Poultry and Pet Stock Association	$20 00	$8 00	$10 00	$10 00	$30 00	$15 00	$12 00	$48 00	$25 00
Androscoggin County	28 00		68 00	26 00	6 00	10 00		140 00	60 00
Aroostook, Northern Maine Fair Association	45 00	28 00	21 00	10 00	43 00	25 00	15 00	26 00	57 00
Cumberland County	7 00	2 00	2 00	2 00				10 00	10 00
Cumberland Farmers' Club	8 00	6 00	8 00	6 00	6 00	15 00	14 00	28 00	35 00
Cumberland, Bridgton Farmers' and Mechanics' Club	4 00	5 00	1 00	2 00	1 00	8 00		11 00	6 00
Cumberland, New Gloucester and Danville				4 00	3 00	16 00	5 00	12 00	10 00
Cumberland, Freeport Agricultural Society									
Cumberland, Freeport Poultry Association			13 00	6 00	20 00	20 00	21 00	33 00	28 00
Franklin County	30 00	12 00	7 00	4 50		13 00	4 00	19 10	5 00
Franklin, North	1 50	7 00	5 00	10 00	2 00	2 00		15 00	
Hancock County	8 00			1 00		2 25	3 00	4 25	10 50
Hancock, North						2 50			
Hancock, Eden	2 00	3 00		3 00	10 00	9 00	6 00	21 50	24 00
Hancock, North Ellsworth Farmers' Club	22 00		5 00	19 00	2 25	6 00	2 63	30 50	7 00
Kennebec County	6 00	3 75	3 75	4 50	3 15	1 58	3 00	30 27	28 40
Kennebec, South				2 10	3 00			14 75	
Knox, North		3 00		3 00					
Lincoln County									10 00
Lincoln, Bristol	60 00	27 00				49 00		35 00	48 00
Oxford County	30 00	16 00	5 00	6 00			14 00	23 20	49 00
Oxford, West	3 00							6 25	50 50
Oxford North	21 00	10 00	5 00	3 75	3 00	10 00	10 00	14 00	72 00
Oxford, Androscoggin Valley	6 00	33 25	6 00			3 00	3 00	16 50	50 00
Oxford, Riverside Park Association									

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Penobscot, West	11 00	9 00	7 00	5 00	–	5 00	–	18 00	107 00
Penobscot, North	2 50	5 00	2 50	–	3 00	3 00	5 00	15 00	3 25
Piscataquis County	10 00	3 00	8 00	6 00	–	6 00	8 00	14 00	40 00
Sagadahoc County	18 00	8 00	–	8 00	9 00	15 00	–	46 00	82 00
Sagadahoc, Richmond Farmers' and Mechanics' Club	1 00	75	–	1 50	1 75	1 50	–	3 60	75
Somerset County	9 00	4 50	–	2 00	4 50	3 50	–	21 50	10 00
Somerset, East	16 00	7 50	–	2 50	–	7 50	3 75	13 75	3 75
Somerset, Central	19 00	44 00	6 00	–	12 00	–	–	5 00	75 00
Somerset, Bingham	–	–	–	4 00	3 50	–	3 00	6 00	8 00
Waldo County	8 00	–	–	6 00	–	3 00	5 00	8 00	21 00
Waldo and Penobscot	44 00	17 00	26 00	5 00	10 00	12 00	–	48 00	125 00
Waldo, Unity Park Association	14 00	6 00	6 00	6 00	6 00	6 00	6 00	16 50	5 00
Washington, West	53 00	–	43 00	–	–	50 00	21 00	127 00	52 00
Washington, Central	10 00	6 00	12 00	–	–	–	4 00	24 00	15 00
York, Shapleigh and Acton	–	–	–	–	3 00	3 00	–	4 50	–
York, Cornish Agricultural Association	22 00	12 00	–	–	6 00	10 00	–	50 00	–
Total	$539 00	$311 75	$270 25	$167 85	$170 15	$332 83	$163 38	$968 17	$1,133 15

ANALYSIS OF AWARDS—Continued.

Name of Society.	Amount of premiums awarded thoroughbred bulls and bull calves.	Amount of premiums awarded thoroughbred cows, heifers and heifer calves.	Amount of premiums awarded grade cows, heifers, and heifer calves.	Amount of premiums awarded herds.	Amount of premiums awarded working oxen and steers.	Amount of premiums awarded matched oxen and steers.	Amount of premiums awarded trained steers.	Amount of premiums awarded beef cattle.	Amount of premiums awarded town teams.	Amount of premiums awarded oxen and steers for draft.
Maine State Poultry and Pet Stock Association	-	-	-	-	-	-	-	-	-	-
Androscoggin County	$21 00	$36 00	$48 00	$8 00	$28 00	$32 00	$9 00	$18 00	$62 00	$73 00
Aroostook, Northern Maine Fair Association	171 00	417 00	48 00	24 00	16 00	-	6 00	-	-	-
Cumberland County	110 00	130 00	65 00	-	40 00	28 00	8 00	22 00	16 00	58 00
Cumberland Farmers' Club	26 00	32 50	50 00	38 00	10 00	15 00	12 00	14 00	27 00	28 00
Cumberland, Bridgton Farmers' and Mechanics' Club	43 50	67 50	12 00	14 00	9 50	25 50	3 00	6 00	36 00	59 00
Cumberland, New Gloucester and Danville	1 50	5 50	4 75	-	-	-	-	-	-	6 00
Cumberland, Freeport Agricultural Society	4 00	12 50	16 00	-	-	-	-	-	-	-
Cumberland, Freeport Poultry Association	-	-	-	-	-	-	-	-	-	-
Franklin County	80 00	120 75	72 25	74 00	20 50	45 00	24 00	21 00	114 00	50 00
Franklin, North	5 00	10 45	14 85	12 00	6 50	7 40	-	6 25	28 00	6 00
Hancock County	20 00	15 00	20 00	-	15 00	12 00	-	8 00	-	15 00
Hancock, North	1 00	-	11 00	-	2 25	2 00	-	-	-	-
Hancock, Eden	3 50	8 50	11 00	3 00	3 00	-	-	-	-	3 00
Hancock, North Ellsworth Farmers' Club	3 50	14 00	11 50	-	1 00	-	-	-	-	-
Kennebec County	35 00	87 25	52 00	24 00	25 50	17 00	-	16 50	27 00	15 00
Kennebec, South	17 50	11 00	37 80	14 25	30 25	28 25	5 50	16 25	49 00	18 75
Knox, North	12 61	28 88	19 22	14 70	20 65	10 50	-	6 30	23 63	23 63
Lincoln County	11 00	26 25	7 00	5 00	6 00	17 50	2 00	6 75	20 00	25 00
Lincoln, Bristol	-	-	6 50	-	8 75	2 00	-	-	-	4 50
Oxford County	127 00	166 00	186 00	36 00	126 00	60 00	-	20 00	102 00	174 00
Oxford, West	66 00	142 00	95 00	68 00	24 50	28 00	-	20 00	72 00	110 00
Oxford, North	3 00	5 00	11 00	8 00	4 75	10 50	3 75	5 00	6 00	8 00

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Oxford, Androscoggin Valley	27 00	61 50	12 50	5 00	40 00	23 00	6 00	11 50	40 00	40 00
Oxford, Riverside Park Association	25 75	60 00	28 75	16 00	48 62	9 37	3 00	–	24 00	34 00
Penobscot, West	22 50	84 00	68 50	46 00	25 00	13 00	3 00	2 00	–	–
Penobscot North	–	–	–	–	–	–	–	–	–	–
Piscataquis County	14 50	9 00	34 75	40 00	–	4 50	10 00	–	–	–
Sagadahoc County	163 75	276 50	131 25	56 00	70 75	51 50	10 50	23 00	48 00	170 50
Sagadahoc, Richmond Farmers' and Mechanics' Club	–	3 20	4 75	3 00	1 40	1 05	50	60	–	–
Somerset County	6 50	11 00	23 50	6 00	14 75	14 00	3 50	13 75	25 00	18 00
Somerset, East	8 00	7 00	41 50	13 00	12 00	–	2 00	5 25	–	–
Somerset, Central	13 00	32 00	35 00	–	–	23 25	–	–	22 00	150 00
Somerset, Bingham	5 00	6 00	8 50	–	–	–	–	–	–	–
Waldo County	10 50	21 50	28 00	25 00	11 00	7 00	–	5 00	55 00	20 00
Waldo and Penobscot	37 00	98 00	41 00	116 00	38 00	12 00	5 00	44 00	80 00	57 00
Waldo, Unity Park Association	15 00	18 50	23 75	19 00	20 00	6 00	5 00	21 00	6 00	10 00
Washington, West	102 00	110 00	98 00	–	68 00	–	–	–	–	18 00
Washington, Central	10 00	23 00	19 50	–	8 00	–	–	–	–	–
York, Shapleigh and Acton	–	–	2 75	–	6 00	30 50	–	6 00	45 00	11 00
York, Cornish Agricultural Association	62 00	125 00	138 00	34 00	128 00	65 00	–	20 00	104 00	78 00
Total	**$1,284 61**	**$2,282 28**	**$1,538 87**	**$721 95**	**$889 67**	**$600 82**	**$121 75**	**$338 15**	**$1,031 63**	**$1,283 38**

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ANALYSIS OF AWARDS—Concluded.

Name of Society.	Amount of premiums awarded sheep	Amount of premiums awarded swine.	Amount of premiums awarded poultry.	Amount of premiums awarded grain and root crops.	Amount of premiums awarded fruit and flowers.	Amount of premiums awarded bread and dairy products.	Amount of premiums awarded honey, sugar and syrups.	Amount of premiums awarded agricultural implements.	Amount of premiums awarded household manufactures and needle work.	Amount of premiums awarded objects not named above.	Total amount of premiums and gratuities awarded.
Maine State Pomological Society	–	–	–	–	–	–	–	–	–	–	–
Maine State Poultry and Pet Stock Association	–	–	$2,001 35	–	–	–	–	–	–	–	$2,001 35
Androscoggin County	$30 00	$12 00	24 00	$82 00	$68 75	$33 50	$14 00	–	$76 25	$179 00	1,011 50
Aroostook, Northern Maine Fair Association	182 00	81 00	126 00	80 25	99 45	42 50	16 00	–	90 45	288 95	2,034 60
Cumberland County	21 00	12 00	155 50	17 50	31 25	35 00	–	–	35 00	21 00	1,075 25
Cumberland Farmers' Club	–	4 00	62 90	39 75	31 30	10 75	–	–	38 95	–	473 15
Cumberland, Bridgton Farmers' and Mechanics' Club	20 00	12 00	35 00	25 75	–	15 50	–	$26 00	33 30	88 25	657 80
Cumberland, New Gloucester and Danville	–	6 00	8 00	9 25	4 15	2 90	4 50	–	20 00	–	110 55
Cumberland, Freeport Agricultural Society	4 75	5 00	28 20	12 70	7 55	4 65	11 00	–	26 75	51 25	234 35
Cumberland, Freeport Poultry Association	–	–	560 16	–	–	–	–	–	–	5 00	565 16
Franklin County	133 75	19 00	53 00	35 30	28 70	19 75	–	–	34 90	162 90	1,291 80
Franklin, North	20 75	1 00	1 35	3 35	4 80	–	1 25	–	16 40	3 40	209 85
Hancock County	12 00	6 00	12 00	64 60	18 00	10 00	7 00	–	10 00	–	286 60
Hancock, North	3 50	–	3 75	20 30	20 20	1 00	1 60	–	27 95	–	115 55
Hancock, Eden	1 00	–	3 90	30 00	14 80	–	–	–	6 00	–	93 20
Hancock, North Ellsworth Farmers' Club	–	–	3 00	100 75	–	6 50	1 25	3 00	24 95	–	174 45

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Kennebec County	19 50	16 00	173 00	50 00	79 00	27 50	8 25	–	39 50	80 00	908 50
Kennebec South	7 00	1 50	6 00	12 75	13 30	7 20	1 50	–	32 34	44 00	417 89
Knox, North	2 63	3 15	13 86	18 90	25 52	9 66	8 24	–	50 92	5 56	366 69
Lincoln County	–	–	15 75	15 50	15 90	4 00	2 25	–	32 50	5 00	244 15
Lincoln, Bristol	2 50	1 50	8 75	14 80	5 50	1 25	–	–	23 45	4 40	93 90
Oxford County	72 00	17 00	45 80	50 00	127 75	36 75	29 50	15 50	106 95	255 00	1,972 25
Oxford, West	15 00	20 50	18 50	10 30	10 35	9 30	6 00	–	16 00	172 00	1,040 65
Oxford, North	12 50	3 00	11 00	12 00	7 70	8 05	1 35	–	26 50	19 50	232 35
Oxford, Androscoggin Valley	–	5 00	15 10	21 60	31 60	5 50	3 25	11 50	12 70	1 35	516 10
Oxford, Riverside Park Association	12 00	11 50	4 50	6 25	7 40	12 15	–	–	13 75	110 00	576 54
Penobscot, West	18 50	8 00	15 00	29 60	45 05	14 95	8 05	–	66 50	100 80	732 45
Penobscot, North	4 75	–	5 00	21 00	61 05	8 00	12 00	–	60 00	–	211 05
Piscataquis County	5 50	–	12 75	1 00	16 75	–	–	–	17 87	–	256 62
Sagadahoc County	32 00	70 00	187 75	121 50	134 50	80 50	11 25	–	99 75	349 37	2,274 37
Sagadahoc, Richmond Farmers' and Mechanics' Club	1 55	40	2 85	13 00	10 10	2 85	2 10	–	12 20	2 10	72 50
Somerset County	40 25	–	22 50	13 90	1 75	2 00	1 10	–	11 85	3 05	287 40
Somerset, East	12 00	12 00	14 75	7 00	6 50	1 00	1 50	–	7 50	34 00	239 75
Somerset, Central	26 00	12 00	66 25	40 10	72 20	25 14	–	7 20	–	194 00	879 14
Somerset, Bingham	1 50	2 00	–	–	1 00	1 00	1 25	–	1 25	–	52 00
Waldo County	37 00	11 00	27 00	27 75	3 00	–	3 00	–	44 50	16 00	403 25
Waldo and Penobscot	29 00	16 00	19 25	58 00	42 00	37 50	1 00	–	108 05	–	1,125 80
Waldo, Unity Park Association	11 00	2 50	2 00	35 50	13 50	8 25	2 25	6 00	36 75	48 00	381 50
Washington, West	111 00	26 00	39 00	216 25	87 65	23 75	6 25	–	191 40	24 50	1,467 80
Washington, Central	9 00	3 00	34 50	28 00	25 20	12 25	75	–	102 70	10 40	357 30
York, Shapleigh and Acton	4 25	1 50	18 25	65 00	30 00	12 00	6 75	–	25 00	54 25	323 75
York, Cornish Agricultural Association	16 00	10 00	61 00	22 00	24 40	6 25	2 00	–	19 30	19 05	1,034 00
Total	**$931 18**	**$411 55**	**$3,913 22**	**$1,433 20**	**$1,227 62**	**$538 85**	**$176 19**	**$69 20**	**$1,600 13**	**$2,352 08**	**$26,802 86**

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FINANCES.

Name of Society	Amount received from State.	Receipts for membership	Receipts from loans.	Receipts from entry fees for trotting purses.	Receipts from all other sources.	Total receipts.
Maine State Pomological	—	—	—	—	—	—
Maine State Poultry and Pet Stock Association	$890 40	$33 00	—	—	$1,255 64	$2,179 04
Androscoggin County	—	62 00	$500 00	$350 00	1,675 00	2,587 00
Aroostook, Northern Maine Fair Association	753 64	30 00	—	379 50	5,136 51	6,299 65
Cumberland County	435 92	—	—	216 25	5,284 98	5,937 15
Cumberland Farmers' Club	145 86	182 50	—	237 50	1,599 74	2,165 60
Cumberland, Bridgton Farmers' and Mechanics' Club	205 07	—	—	82 50	690 75	978 32
Cumberland, New Gloucester and Danville	—	—	—	70 00	465 59	535 59
Cumberland, Freeport Agricultural Society	94 70	—	120 00	66 75	461 49	742 94
Cumberland, Freeport Poultry Association	175 88	25 00	—	287 50	274 16	762 54
Franklin County	429 06	714 00	—	610 00	3,560 85	5,313 91
Franklin, North	60 69	278 00	—	130 25	666 22	1,135 16
Hancock County	126 47	—	—	143 75	1,770 03	2,040 25
Hancock, North	53 40	—	—	—	608 15	661 55
Hancock, Eden	31 20	—	—	—	485 26	516 46
Hancock, North Ellsworth Farmers' Club	49 60	3 00	—	—	641 83	694 43
Kennebec County	346 36	2 00	—	60 00	1,672 14	2,089 50
Kennebec, South	175 93	—	—	25 00	1,031 77	1,232 70
Knox, North	116 47	2 00	—	—	1,751 64	1,870 11
Lincoln County	102 37	7 00	100 00	33 00	1,161 52	1,403 89
Lincoln, Bristol	31 00	75	—	—	218 05	249 80
Oxford County	748 66	16 00	—	537 50	5,776 06	7,078 22
Oxford, West	381 03	140 00	—	310 50	2,949 09	3,780 62
Oxford, North	67 14	—	—	64 50	683 75	815 39
Oxford, Androscoggin Valley	200 00	3 00	—	260 00	2,252 49	2,724 58

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Oxford, Riverside Park Association	160 00	–	–	105 00	1,009 62	1,274 62
Penobscot, West	237 54	32 00	–	275 00	1,538 00	2,082 54
Penobscot, North	82 04	–	–	–	417 96	500 00
Piscataquis County	–	–	–	–	–	–
Sagadahoc County	777 50	66 00	1,600 00	715 00	6,366 86	9,525 36
Sagadahoc, Richmond Farmers' and Mechanics' Club	26 34	–	–	–	116 15	142 49
Somerset County	106 51	–	–	170 00	614 40	890 91
Somerset, East	142 61	175 00	165 00	–	929 72	1,412 33
Somerset, Central	219 92	30 00	–	200 00	1,525 47	1,975 39
Somerset, Bingham	28 37	25 00	–	–	13 09	66 46
Waldo County	–	–	–	–	–	2,162 87
Waldo and Penobscot	347 94	–	–	310 00	3,055 04	3,712 98
Waldo, Unity Park Association	169 28	4 00	–	166 85	605 00	945 13
Washington, West	502 89	5 00	270 87	230 00	3,374 39	4,383 15
Washington, Central	–	7 00	–	93 00	1,806 00	1,906 00
York, Shapleigh and Acton	135 45	195 00	60 00	–	54 00	444 45
York, Cornish Agricultural Association	–	–	700 00	410 00	1,798 15	2,908 15
Total	$8,566 42	$2,037 25	$3,515 87	$6,548 35	$65,296 56	$88,127 32

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FINANCES—Concluded.

Name of Society.	Amount expended in improvements.	Amount expended in trotting purses.	Expenses during the fair.	Amount expended for all other purposes.	Total amount paid out including premiums and gratuities.	Value of property belonging to the society.	Amount of liabilities.
Maine State Pomological	–	–	–	–	–	–	–
Maine State Poultry and Pet Stock Association	–	–	–	–	–	$1,500 00	–
Androscoggin County	–	$800 00	$364 00	–	$2,175 50	1,500 00	$1,000 00
Aroostook, Northern Maine Fair Association	$1,000 00	931 50	1,930 51	$600 00	6,496 61	15,000 00	700 00
Cumberland County	1,716 48	832 00	1,396 32	–	5,020 05	6,000 00	300 00
Cumberland Farmers' Club	240 60	627 50	382 15	412 44	2,135 84	3,500 00	175 00
Cumberland, Bridgton Farmers' and Mechanics' Club	50 00	450 00	75 00	50 00	1,282 80	4,000 00	–
Cumberland, New Gloucester and Danville	50 98	185 00	39 56	95 91	482 00	2,500 00	50 00
Cumberland, Freeport Agricultural Society	–	450 00	139 50	–	823 85	2,000 00	800 00
Cumberland, Freeport Poultry Association	21 25	–	190 36	16 00	792 77	270 00	50 00
Franklin County	1,810 07	1,500 00	316 00	–	4,917 87	10,000 00	–
Franklin, North	–	400 00	290 65	444 51	1,345 01	2,000 00	2,294 45
Hancock County	150 00	588 75	588 82	–	1,614 17	5,000 00	–
Hancock, North	–	–	541 55	–	657 10	200 00	–
Hancock, Eden	374 77	–	321 57	–	789 54	1,500 00	691 40
Hancock, North Ellsworth Farmers' Club	–	–	323 00	66 50	563 95	2,000 00	390 00
Kennebec County	75 00	478 48	200 00	120 00	1,781 98	1,500 00	1,505 00
Kennebec, South	–	322 50	252 39	389 77	1,382 55	2,000 00	–
Knox, North	50 00	396 00	668 65	357 53	1,838 87	1,000 00	400 00
Lincoln County	–	216 40	400 00	519 33	1,379 88	2,000 00	391 50
Lincoln, Bristol	–	–	85 20	29 50	208 60	1,200 00	115 85
Oxford County	681 54	1,422 50	985 06	1,270 42	6,331 77	12,000 00	–
Oxford, West	65 00	1,210 00	160 00	1,304 97	3,780 62	9,500 00	1,800 00
Oxford, North	20 00	271 25	50 00	231 35	804 95	800 00	170 00
Oxford, Androscoggin Valley	–	780 00	229 70	1,119 39	2,645 19	4,000 00	2,870 00

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Oxford, Riverside Park Association	124 75	675 00	22 00	–	1,398 29	–	–
Penobscot, West	175 50	800 00	452 20	157 00	2,317 15	6,000 00	4,800 00
Penobscot, North	20 00	–	75 00	25 00	331 05	–	–
Piscataquis County	–	–	–	–	–	–	–
Sagadahoc County	300 00	1,530 00	1,941 95	4,099 35	10,145 67	5,000 00	1,658 82
Sagadahoc, Richmond Farmers' and Mechanics' Club	12 94	–	36 85	43 10	165 39	–	12 33
Somerset County	45 30	425 00	125 10	–	882 80	500 00	–
Somerset, East	169 13	300 00	37 50	347 72	1,094 10	2,000 00	763 55
Somerset, Central	275 30	1,175 00	95 29	–	2,424 73	4,000 00	2,000 00
Somerset, Bingham	–	–	13 15	–	65 15	–	–
Waldo County	100 00	1,003 98	–	–	1,507 23	4,000 00	1,200 00
Waldo and Penobscot	300 00	892 50	500 00	704 35	3,522 65	10,000 00	–
Waldo, Unity Park Association	50 00	517 00	210 00	–	1,158 50	–	213 37
Washington, West	165 73	511 50	1,621 60	469 96	4,236 59	1,936 00	1,732 69
Washington, Central	400 00	435 00	476 33	–	1,668 63	–	–
York, Shapleigh and Acton	–	–	23 50	15 00	362 25	2,000 00	–
York, Cornish Agricultural Association	325 84	1,055 00	493 31	–	2,908 15	4,000 00	766 93
	$8,770 18	$21,181 86	$16,053 77	$12,889 10	$83,439 80	$130,406 00	$26,850 89

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Exhibition tables at Gardiner Exhibition

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APPENDIX.

Annual Report of the State Pomological Society

1907-1908.

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SECRETARY'S REPORT.

INJURED FRUIT TREES.

It might not seem necessary to mention the past winter in connection with fruit growing were it not for the fact that the winter is blamed by many for the injury suffered by our orchards. So far as your Secretary is concerned he does not "blame it all on the weather," while the injury is more serious than most of our fruit growers realize, there are other conditions that should be recognized. The Baldwin and Ben Davis suffered the most. Those varieties are both free bearers, and the growers look upon the tree hanging full of beautiful fruit and rejoice over the magnificent crop of fruit promised. I do not know of a fruit grower in Maine who has to any great extent felt it necessary to relieve the trees of the heavy burdens they were bearing. In one case the present season a prominent grower told me he had used over 1,500 stakes to prevent the trees from breaking down. In a canvass covering a large number of orchards this fall a conspicuous fact appears: the dead and injured trees are almost without exception trees that bore heavily the year before. In other words the trees have been so weakened by overbearing that they have not had the power to resist the cold. Many trees that have borne heavily this year I found seriously injured, and it will be strange if there are not many more dead trees next spring than the last. The Secretary suggests whether it would not be wiser to pick off some fruit and burn up the stakes. The extent of this injury was shown by speakers at our meeting, who have been investigating orchard conditions in the State. Yet notwithstanding this unfavorable condition, the New England Homestead reports the crop in Maine this year at 1,700,000 barrels, and in an editorial upon the fruit situation remarks that Maine has now come to be an

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important factor in measuring up the apple situation in the United States. This is the largest crop thus far credited to Maine.

LARGER ORCHARDS AND BETTER CARE.

In going about among the fruit growers of the State several facts are noted. One is the increase in the size of the orchards. Twenty-five years ago a man with a thousand apple trees was called an "Apple King." Today there are many orchards in the State that contain many more trees than that, and quantities of farmers have five hundred or more trees. The extent of the industry is a genuine surprise to all, and it is very doubtful if more than one-half of the trees have come into bearing. This is indeed significant of what the future has in store for us.

Another fact to which attention was called in the last report of the Secretary is the better care the orchards are receiving. It is apparent in all parts of the State, that the trees are better fed, better pruned, and it will not be many years when our growers will not permit their trees to bear themselves to death.

OUTGROWN THE CAPACITY OF THE GROWERS.

Another interesting and astonishing fact is that the industry seems to have outgrown the capacity of the growers to handle the fruit economically. As a result of this one finds thousands of barrels of fruit unpicked and ruined by the cold. The cellars and store rooms are full of fruit and thousands of barrels of apples are today stored in open sheds and outbuildings, and the slump in the market to no small degree may be traced to the rush of the growers to get their apples into the market before they froze at home.

So far as conditions in fruit growing have improved in the State our society may justly claim a large share of credit. Ever since its organization the society has held up before the people of the State the possibilities of fruit culture that are being realized today. At the same time they have always urged a rational and kindly treatment of the apple tree.

They have advised against the planting of nursery freaks and steadily held up before the fruit growers the best and most reliable of varieties. Alas, in many cases the oily, polished words of the tree agent have overshadowed all this, and not a few growers have come to grief in consequence.

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MEETINGS OF EXECUTIVE COMMITTEE.

Only two meetings of the committee were held during the year, both in Augusta. The President and Secretary were instructed to appear before the Agricultural Committee in fruit matters calling for legislation. The purchase of an experiment farm for fruit purposes for the Experiment Station was referred to the next legislature. It did not seem necessary for them to attend the hearing on the insect legislation, and it seemed inexpedient to ask for an increase in the stipend at this time.

FIELD MEETINGS.

Two field meetings were held, one in Monmouth and one in Wilton. At these meetings the general subject of spraying was presented. No extended report of these meetings appear, but in this connection attention is called to the letter of Mr. M. B. Waite of the Agricultural Department at Washington which appears in another part of the transactions. The meeting at Monmouth was held in Grange Hall and a model grange dinner was served by Monmouth Grange. It was largely attended. At Wilton the attendance was smaller, but good results have followed both meetings.

NEW ENGLAND HORTICULTURAL SOCIETIES COME TOGETHER.

The year the Canadian Fruit Marks Act became a law the Secretary called the attention of the society to the desirability of such a law for Maine fruit growers, and in one form or another the subject matter has been before the society since. At the Canton meeting in 1905, Dr. G. M. Twitchell was made a special committee to take up the matter of national legislation along the line of this act. The committee was continued in 1906 at Harrison and through Dr. Twitchell's influence a meeting of delegates from the New England Horticultural Societies was arranged for under the auspices of the Massachusetts Fruit Growers Association in Worcester. All the societies were represented and at the instance of President Gilbert I had the pleasure of attending the meeting. There was such a delightfully sympathetic feeling among the delegates, your Secretary felt that nothing but good could come from more similar meetings in the future. We are in close touch with one another geograph-

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ically. We have the same markets, and climatic conditions are similar to a large extent. With the hope of bringing about more intimate relations, your Secretary invited the several societies represented to send delegates to our annual meeting. The proposition met with a cordial response, and as a result we had with us delegates from the several societies in New England.

It was an altogether pleasant and novel feature of the meeting, and it is a pleasure to note, as will be seen by the transactions, that the invitation of the Connecticut Pomological Society to meet with them at Hartford at their annual meeting in February was accepted.

THE ANNUAL MEETING.

The cordial reception given to the society and its visitors by the Gardiner Board of Trade and the citizens generally was the pleasantest feature of the meeting. It is pleasant and helpful in this work to be among one's friends. Appreciation and courtesy are great stimulants in all our efforts in this world, which is too often indifferent to the best things.

The papers and discussions were timely and helpful and it is with pleasure they are now submitted to the fruit growers of the State.

IN CONCLUSION.

The fruit growers of the State are expecting much from the society and it is right they should, for that is just what the society was organized for. There are thousands of fruit growers in the State, but since the organization only a handful, so to speak, of the most enthusiastic fruit growers have united with the society. Is there any good reason why so many for their own assistance should expect so much from so few enthusiasts? What the society now needs is the hearty support and active membership of the fruit growers of Maine. This would enable the society to do work that it has never before undertaken.

This report will close a long term of official life in connection with the society. While there has been an increasing amount of labor with each successive year, the service has been cheerfully given. The results have made a good showing for the society. Personally I wish to thank the members for their continued confidence in placing the duties of the office in my charge. I also wish especially to thank my official associates for their assistance

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and cordial cooperation in conducting the affairs of the society, for this more than all besides has been the means upon which I have relied to carry on the work. They have freely given their time to the cause, and the value of their services should not be overlooked.

My interest in the work of the society will be no less as a member, and I shall esteem it a pleasure to assist in any way I may to carry on its work in the future.

D. H. KNOWLTON,
Secretary.

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OFFICERS FOR 1907.

President.

Z. A. GILBERT, North Greene.

Vice Presidents.

D. P. TRUE, Leeds Center.
EDWARD L. WHITE, Bowdoinham.

Secretary.

D. H. KNOWLTON, Farmington.

Treasurer.

E. L. LINCOLN, Wayne.

Executive Committee.

The President and Secretary, *ex-officio;* Will E. Leland, East Sangerville; V. P. DeCoster, Buckfield; Charles E. Wheeler, Chesterville.

Trustees.

Androscoggin county, A. C. Day, South Turner.
Aroostook county, Edward Tarr, Mapleton.
Cumberland county, John W. True, New Gloucester.
Franklin county, E. E. Hardy, Farmington.
Hancock county, Chas. G. Atkins, Bucksport.
Kennebec county, E. R. Mayo, Hallowell.
Knox county, Alonzo Butler, Union.
Lincoln county, H. J. A. Simmons, Waldoboro.
Oxford county, F. H. Morse, Waterford.
Penobscot county, W. M. Munson, Orono.
Piscataquis county, C. C. Dunham, Foxcroft.
Sagadahoc county,————
Somerset county, Frank E. Nowell, Fairfield.
Waldo county, Fred Atwood, Winterport.
Washington county, D. W. Campbell, Cherryfield.
York county, J. Merrill Lord, Kezar Falls.

Member Experiment Station Council.

CHARLES S. POPE, Manchester.

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MEMBERS OF THE SOCIETY.

NOTE.—Any errors or changes of residence should be promptly reported to the Secretary. Members will also confer a favor by furnishing the Secretary with their full Christian names where initials only are given.

LIFE MEMBERS.

Allen, Wm. H.....Buckfield
Andrews, A. Emery.....Gardiner
Andrews, Charles E.....Auburn
Arnold, C. A.....Arnold
Atherton, Wm. P.....Hallowell
Atkins, Charles G.....Bucksport
Atwood, Fred.....Winterport
Averill, David C.....Temple
Bailey, W. G.....Freeport
Bennoch, John E.....Orono
Bickford, Lewis I.....Dixmont Center
Bisbee, George E.....Auburn
Blanchard, Mrs. E. M.....Lewiston
Blossom, L. H.....Turner Center
Boardman, Samuel L.....Bangor
Briggs, John.....Turner
Burr, John.....Freeport
Butler, Alonzo.....Union
Chadbourne, C. L.....North Bridgton
Chandler, Mrs. Lucy A.....Freeport
Chase, Henry M.,103 Federal St., Portland
Corbett, Herman.....Farmington
Craig, William.....Auburn
Crowell, Mrs. Ella H.....Skowhegan
Crowell, John H.....Farmington
Dana, Woodbury S.....Portland
Dawes, S. H.....Harrison
DeCoster, Virgil P.....Buckfield
Denison, Mrs. Cora M.....Harrison
DeRocher, Peter.....Bradentown, Fla.
Dirwanger, Joseph A.....Portland
Dunham, W. W.....North Paris
Dyer, Milton.....Cape Eilzabeth
Emerson, Charles L.....South Turner
Farnsworth, B. B.....Portland
Frost, Oscar F.....Monmouth
Gardiner, Robert H.....Gardiner
George, C. H.....Hebron
Gilbert, Z. A.....North Greene
Goddard, Lewis C.....Woodfords
Grover, Franklin D.....Bean
Gulley, Alfred G.....Storrs, Conn.
Hackett, E. C.....West Gloucester
Hall, Mrs. H. A.....Brewer
Hanscom, John.....Saco
Hardy, E. E.....Farmington
Harris, William M.....Auburn
Hixon, A. A.....Worcester, Mass.
Hoyt, Mrs. Francis.....Winthrop
Jackson, F. A.....Winthrop
*Jones, J. H.....Mercer
Keene, Charles S.....Turner
Knowlton, D. H.....Farmington
Lapham, E, A.....Pittston
Leland, Will E.....East Sangerville
Lincoln, E. L.....Wayne
Litchfield, J. H.....Auburn
Litchfield, Mrs. L. K.....Lewiston
Lombard, Thurston M.....Auburn
Lord, J. Merrill.....Kezar Falls
Luce, Willis A.....Columbia Falls
Macaulay, T. B.....Montreal, Can.
McAllister, Zaccheus.....West Lovell
McCabe, George L.....North Bangor
McLaughlin, Henry.....Bangor
McManus, John.....Brunswick
Merrill, Oliver F.....Gardiner
Mitchell, Frederick H.....Turner
Moody, Charles H.....Turner
Moore, William G.....Monmouth
Moor, F. A.....Waterville
Morse, F. H.....Waterford
Morton, J. A.....Bethel
Munson, W. M.....Morgantown, W. Va.
Page, F. W.....Augusta
Palmer, George L.....South Livermore
Parsons, Howard G.....Turner Center
Pope, Charles S.....Manchester
Prince, Edward M.....West Farmington
Pulsifer, D. W.....Poland
Purington, E. F.....Farmington
Richards, John T.....Gardiner
Ricker, A. S.....Turner
Roak, George M.....Auburn
Sanborn, Miss G. P.....Augusta
Sawyer, Andrew S.....Cape Elizabeth
Seavy, Mrs. G. M.....Auburn
Simmons, H. J. A.....Waldoboro
Skillings, C. W.....North Auburn
Smith, Henry S.....Monmouth
Snow, Mary S.....Bangor
Stanley, H. O.....Winthrop
Staples, Geo. W., 904 Main St., Hartford, Conn
Starrett, L. F.....Warren
Stetson, Henry.....Auburn
Stilphen, Asbury C.....Gardiner
Taylor, Miss L. L.....(Lakeside) Belgrade
Thomas, William W.....Portland
Thomas, D. S.....North Auburn
Thurston, Edwin.....West Farmington
Tilton, William S.....Boston, Mass.
Townsend, Mrs. B. T.....Freeport
True, Davis P.....Leeds Center
True, John W.....New Gloucester
Turner, E. P.....New Vineyard
Twitchell, Geo. M.....Auburn
Vickery, James.....Portland
Vickery, John.....Auburn

*Deceased.

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LIFE MEMBERS—Concluded.

Wade, Patrick.....Portland
Walker, Charles S.....Peru
Walker, Elmer V.....Oxford
Waterman, Willard H.....East Auburn
Waugh, F. A.....Amherst, Mass.
Weston, Joseph.....Gardiner
Wheeler, Charles E.....Chesterville
White, Edward L.....Bowdoinham
Woods, Chas. D.....Orono
Yeaton, Samuel F.....West Farmington

ANNUAL MEMBERS, 1905.

Abbott, S. E.....Bethel
Bass, Mary A.....Wilton
Berry, W. F.....Canton
Briggs, Arthur B.....Canton
Bryant, C. A.....Livermore Center
Campbell, D. W.....Cherryfield
Chase, Solon.....Chase's Mills
Craig, William.....Auburn
DeCoster, Mrs. V. P.....Buckfield
Ellis, Mrs. Kate B.....Fairfield
Fairbanks, A. E.....North Monmouth
Goodale, G. C.....Winthrop
Greenleaf, A. C.....Farmington
Hardy, E. E.....Farmington
Hitchings, E. F.....Waterville
Leland, Will E.....East Sangerville
Lincoln, Mrs. E. L.....Wayne
Mayo, E. R.....Hallowell
McLatchey, R.E....46 Clinton St., Boston
Mendell, Mrs. C. E.....Hartford
Merchant, S. L.....Winthrop
Nowell, F. E.....Fairfield
Perley, F. B.....Vassalboro
Scales, Lilla M.....Temple
Shurtleff, S. G.....South Livermore
Smith, Mrs. F. A.....Canton
Spaulding, Stephen.....North Buckfield
Staples, George W.....Temple
Stetson, T. B. W.....Canton
Toothaker, L. P.....Etna
Tucker, Benjamin.....Norway
Virgin, G. H.....Canton
Virgin, Mrs. G. H.....Canton
Walker, Mrs. F. L.....Canton
Wallingford, John.....Auburn
Washburn, C. C.....Mechanic Falls
White, Edward L.....Bowdoinham
Whittemore, F. H.....Livermore Falls

ANNUAL MEMBERS, 1906.

Arnold, F. A.....Arnold
Bennett, Elizabeth A.....Harrison
Breed, W. O.....Harrison
Burnell, R. A.....West Baldwin
Chadbourne, J. A.....North Bridgton
Chadbourne, W. C.....North Bridgton
Cobb, W. F.....Turner Center
Craig, William.....Auburn
Dorsey, Maxwell J.....Orono
Dunham, C. C.....Foxcroft
Flint, Mrs. John B.....Harrison
Frost, H. F.....Wayne
Goodale, G. C. & W. E.....Winthrop
Greene, J. L.....Harrison
Guptill, Florence.....Topsham
Hobart, O. R.....Auburn
Leavitt, L. C.....Kezar Falls
Mayo, E. R.....Hallowell
Merchant, S. L.....Winthrop
Nowell, Frank E.....Fairfield
O'Neil, Joshua H.....Portland
Pike, Albert J.....Wayne
Pike, J. M.....Wayne
Shurtleff, S. G.....South Livermore
Tarr, Edward.....Mapleton
Thorpe, B. F. W.....Augusta
Tucker, Benjamin.....Norway
Warren, Jessie B.....Harrison
Washburn, C. C.....Mechanic Falls
Waterman, L. C.....Buckfield
Watson, Bernice.....Gardiner
Wilbur, Georgine V.....Phillips

ANNUAL MEMBERS, 1907.

Arnold, F. A.....Arnold
Beckenstrater, Herman.....Orono
Bird, L. M.....West Gardiner
Caldwess, Mrs. G. H.....Gardiner
Carter, Mrs. Wesley A...Gardiner, R. F. D.
Clarke, L. H.....Gardiner
Clements, D. S.....Winthrop
Cobb, W. F.....Turner Center
Cobb, Mrs. W. F.....Turner Center
Danforth, Geo. R.....Gardiner
Frost, H. T.....Wayne
Fuller, Winslow.....Livermore Falls
Guptill, F. B.....Cornish
Hitchings, E. F.....Waterville
Hurd, W. D.....Orono
Johnston, Mrs. Arthur E.....Washington
Jones, Fred R.....Mercer
King, John H.....Bowdoinham
Lancaster, Mrs. L. M.....Gardiner
Leavitt, L. C.....North Parsonsfield
Libbey, G. D.....Gardiner
Look, Mrs. J. W.....Gardiner
Lovely, Lillian.....Gardiner
Merchant, S. L.....Winthrop
Miller, William.....Bar Harbor
Morse, W. J.....Orono
Nowell, F. E.....Fairfield
Paine, Horace M.....Jay
Patch, Edith M.....Orono
*Perley, F. B.....Vassalboro
Pike, Albert J.....Wayne
Ricker, W. J.....Turner
Searles, Ida.....Gardiner, R. F. D.
Shaw, Silas A.....Auburn
Tarr, Edward.....Mapleton
Taylor, Frank.....Winthrop
Thorpe, B. F. W.....Augusta
Waterman, L. C.....Buckfield

ANNUAL MEMBERS, 1908.

Bowers, John W.,.....327 Congress St.,Portland

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REPORT OF THE EXECUTIVE COMMITTEE.

A comprehensive view of the general work of the society for the past year may be gained by the reading of the reports of the officers and the numerous papers and discussions offered at the meetings held by the society.

Two meetings of the executive have been held during the year, the necessary business outside of these meetings being transacted when the officers were attending the general meetings of the society.

The results show that it has been a prosperous year for the society, though it is the regret of all that fruit growers in the State, while looking to the society for the promotion of the fruit industry in the State, are indifferent to our appeals to unite with and join hands in the work. This year we have received *seven* life members and *thirty-nine* annual members, and the larger part of these have been made members by way of premiums. There never was so much work for the society as at the present time, and never so much expected from it.

As to the finances of the society we are glad to report them in good condition. During the year we have purchased two $500 first mortgage bonds of the Stockton Springs Water Company, bearing 4½%, at a cost of $970.

We have examined the treasurer's accounts and find them vouched for and well kept. The summary following will show the purposes for which the money of the society has been expended and the present condition of its financial affairs.

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RECEIPTS.

Cash in treasury January 1, 1907	$ 15
State stipend for 1907	1,000 00
Interest on permanent fund	64 07
Interest on deposit	4 72
Interest accrued on bonds	14 25
Cash from permanent fund withdrawn for bond purchase	970 00
Membership fees—life	70 00
Membership fees—annual	39 00
Overdrawn	80 87
	$2,243 06

EXPENDITURES.

Executive committee expense	$92 08
Treasurer's expense	6 00
Salary of secretary	150 00
Salary of treasurer	25 00
Speakers	21 40
Judges	15 75
Postage	28 98
Premiums for 1907	301 75
Local expenses annual meeting	41 24
Binding transactions	28 65
Printing and stationery	87 69
Hotel bills—officers	71 75
Hotel bills—speakers	55 40
Hotel bills—judges	22 00
Hotel bills—assistants	12 50
Stenographic report of the annual meeting	54 50
Freight, express and telephone	6 54
Badges	6 40
Sundries	12 18
Banquet tickets for guests	7 50
Sprayer at field meeting	6 00
Special committee	5 50
Bonds for permanent fund	970 00
Accrued interest on bonds	14 25
Permanent fund—life membership fees to date	200 00
	$2,243 06

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RESOURCES.

Due from State for 1908	$1,000 00
Permanent fund	1,710 00
	$2,710 00

LIABILITIES.

Overdrawn	$80 87
Net resources	2,629 13
	$2,710 00

PERMANENT FUND.

National bank stock	$400 00
Bonds, Stockton Springs Water Co., at cost	970 00
On deposit	340 00
	$1,710 00

Respectfully submitted.

Z. A. GILBERT,
D. H. KNOWLTON,
WILL E. LELAND,
V. P. DeCOSTER,
CHAS. E. WHEELER,
Executive Committee.

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REPORT OF TREASURER.

Ellis L. Lincoln, Treasurer, in account with the Maine State Pomological Society for the year 1907.

January 1,	To balance brought forward from 1906	$ 15
	To received from First Natl. Bank, Farmington, interest on stock	12 00
April 4,	Received from the Augusta Trust Co., Winthrop Branch. Cash withdrawn	54 00
20,	Received from State stipend	1,000 00
May 8,	Received from Augusta Trust Co., cash withdrawn	362 65
July 1,	Received from First Natl. Bank, Farmington, interest on stock	12 00
	Received from Stockton Springs Water Co., interest on bonds accrued	14 25 8 25
October 28,	Received from H. T. Frost, Wayne, annual fee	1 00
November 8,	Received from the Livermore Falls Trust and Banking Co., interest of certificate of deposit	4 72
	Received from Albert J. Pike, Wayne, annual fee	1 00
December 9,	Received from Augusta Savings Bank, cash withdrawn	430 00
	Received from Augusta Savings Bank, interest	22 41
13,	Received from George W. Staples, Temple Life Member fee	10 00
14,	Received from F. A. Arnold, Carmel, annual fee	1 00
	Received from L. M. Bird, West Gardiner, annual fee	1 00
	Received from Mrs. G. H. Caldness, Gardiner, annual fee	1 00
	Received from Ida Searles, Chelsea, annual fee	1 00
	Received from L. H. Clark, Gardiner, annual fee	1 00
	Received from Mrs. Wesley A. Curtis, Gardiner, annual fee	1 00
	Received from Geo. R. Danforth, Gardiner, annual fee	1 00
	Received from Fred R. Jones, Mercer, annual fee	1 00
	Received from Mrs. L. M. Lancaster, Gardiner, annual fee	1 00
	Received from Mrs. J. W. Lash, Gardiner, annual fee	1 00
	Received from L. C. Leavitt, North Parsonsfield, annual fee	1 00
	Received from G. D. Libby, Gardiner, annual fee	1 00
	Received from Mrs. Lillian Loveley, Gardiner, annual fee	1 00
	Received from S. L. Merchant, Winthrop, annual fee	1 00
	Received from F. B. Perley, Vassalboro, annual fee	1 00
	Received from Edward Tarr, Mapleton, annual fee	1 00
	Received from L. C. Waterman, Buckfield, annual fee	1 00
	Received from D. H. Knowlton, the following life members:	
	Joseph Weston, Gardiner	10 00
	Oliver F. Merrill, Gardiner	10 00
	W. H. Allen, Buckfield	10 00
	A. A. Hixon, Worcester, Mass	10 00
	Chas. D. Woods, Orono	10 00
	Received from D.H. Knowlton, the following annual members:	
	F. B. Guptill, Cornish	1 00

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December 14,	F. E. Merrill, Fairfield	1 00
	W. F. Cobb, Turner Center	1 00
	Mrs. W. F. Cobb, Turner Center	1 00
	W. J. Ricker, Turner	1 00
	Arthur E. Johnston, Washington	1 00
	John H. King, Bowdoinham	1 00
	B. F. W. Thorpe, Augusta	1 00
	W. J. Morse, Orono	1 00
	W. D. Hurd, Orono	1 00
	Winslow Fuller, Livermore Falls	1 00
	Herman Beckenstrater, Orono	1 00
	William Miller, Buckfield	1 00
	Horace M. Paine, Jay	1 00
	E. F. Hitchings, Waterville	1 00
	E. M. Patch, Orono	1 00
	Silas A. Shaw, Auburn	1 00
	D. S. Clement, Winthrop	1 00
	Frank Taylor, Winthrop	1 00
	To received from D. H. Knowlton in favor of Wm. Craig, life member fee	10 00
	To received cash	130 00
	To received interest on deposit	2 10
	To received interest on deposit	66
	To annual fee, J. D. Lincoln	1 00
	Balance due treasurer, Jan. 1, 1906	80 87
		$2,243 06

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1906.		
December 28,	By paid Chas. E. Wheeler, order No. 949, expense as executive committee	3 00
	By paid Cony House, Augusta, board of Executive Committee, order No. 948	12 50
April 8,	By paid D. H. Knowlton, expense as Secretary, etc., order No. 954	21 51
	By paid Cony House, Augusta, board of Executive Committee, order No. 953	12 00
	By paid Z. A. Gilbert, expense as President at Augusta, order No. 955	9 10
	By paid Will E. Leland, travel to Augusta, order No. 950	3 90
	By paid V. P. DeCoster, travel to Augusta, order No. 951	3 70
	By paid Chas. E. Wheeler, travel and expense at Augusta, No. 952	2 75
25,	By paid Mason & Merrill for Stockton Springs Water Company bonds, order No. 990	970 00
	By paid Mason & Merrill for interest on bond, 3 months,24 days	14 25
May 10	By paid L. F. Dyke, for drawing spraying machine at Wilton, order No. 958	6 00
	By paid Royal D. Blaisdell, board of officers at Wilton, order No. 960	8 00
	By paid V. P. DeCoster, travel to and from Wilton Field Meeting, order No. 959	3 00
	By paid Z. A. Gilbert, travel and expense at Wilton, order No. 962	1 70
	By paid E. L. Lincoln, travel and expense at Wilton, No. 961	2 00
	By paid Will E. Leland, travel and expense at Monmouth, order No. 956	5 29
	By paid D. H. Knowlton, travel and cash paid for board at Field Meeting at Wilton and Monmouth, No. 957	15 21
	By paid D. H. Knowlton, for postage for future use, No. 963	10 00

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September 28,	By paid D. H. Knowlton, for salary as Secretary in part for 1907, order No. 964	$50 00
November 29,	By paid Smith & Reid, binding Pomological Report, 1906, order No. 965	28 65
	By paid Whitehead & Hoag Co., No. 966	6 40
	By paid Hall & Cole for one box apples on exhibition at Gardiner, order No. 967	3 25
	By paid J. W. Carsley, for bill, order No. 968	5 60
	By paid G. M. Twitchell, expense attending meeting at Worcester, order No. 969	5 50
	By paid C. E. Robinson, expense at Gardiner, order No. 971	4 00
	By paid A. A. Hixon, expense at Gardiner, order No. 970	10 00
	By paid T. L. Kenney, for expense at Gardiner, order No. 972	21 40
	By paid Gardiner Publishing Co., order No 973	9 50
	By paid S. G. Shurtleff, for service as judging fruit at Gardiner, order No. 974	5 75
	By paid A. E. Andrews, for 15 complimentary tickets, order No. 975	7 50
December 14,	By paid Fred R. Jones, order No. 978	1 00
	By paid John W. Clark, order No. 988	11 00
	By paid E. L. Lincoln, Treasurer, premiums at Gardiner, order No. 989	301 75
	By paid V. P. DeCoster, order No. 984	3 65
	By paid E. L. Lincoln, for cash paid Janitor at Gardiner, order No. 985	4 50
	By paid C. H. Douglass, order No. 986	9 00
	By paid Z. A. Gilbert, expense at Gardiner, order No. 976	3 06
	By paid Will E. Leland, expense at Gardiner, order No. 977	4 55
	By paid D. H. Knowlton, order No. 978	15 13
	By paid D. H. Knowlton, order No. 979	15 05
	By paid Chas. E. Wheeler, expense at Gardiner, order No. 980	4 35
	By paid A. E. Andrews, order No. 981	32 74
	By paid C. H. Douglass, hotel expense, order No. 982	109 15
	By paid E. L. Lincoln, travel and expense at Gardiner	4 00
January 17,	By paid Knowlton & McLeary Co., order No. 991	76 07
	By paid E. L. Lincoln, Treas., order No. 992	25 00
	By paid D. H. Knowlton, Secretary, order No. 993	100 00
	By paid Miss L. B. Raynes, No. 944	54 50
	By paid D. H. Knowlton, order No. 995	4 78
	By paid V. P. DeCoster, order No. 996	2 32
	By paid E. L. Lincoln, Treas., transfer of Life Members from General Fund to Permanent Fund for the years 1905-06 and '07	200 00
		$2243 06

PERMANENT FUND FOR THE YEAR 1907.

December 31,	By members as reported for the year 1906	$1,640 00
Fees received for the year 1907:		
	Geo. W. Staples $10 00	
	Oliver F. Merrill 10 00	
	Josh Weston 10 00	
	W. H. Allen 10 00	
	A. A. Hixon 10 00	
	Chas. D. Woods 10 00	
	Wm. Craig 10 00	
		$1,710 00
Permanent fund invested as follows:		
Four shares stock First National Bank of Farmington	$400 00	
Two bonds Stockton Springs Water Co., first mortgage at cost	970 00	
Deposit in Savings Banks	340 00	
		$1,710 00

Respectfully submitted,

ELLIS L. LINCOLN, Treasurer.

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BUSINESS TRANSACTIONS.

MEETINGS OF EXECUTIVE COMMITTEE.

AUGUSTA, December 27, 1907.

Session to close up affairs for 1906 and lay out plans for 1907.

Commissioner A. W. Gilman and Prof. E. F. Hitchings appeared before the committee and informed the members of the situation with reference to the brown-tail and gypsy moths in the State. Later Capt. E. E. Philbrook of Portland and Mr. D. M. Rogers, the government agent for the suppression of the gypsy moth, came in and gave information concerning the work carried on by the general government.

The Secretary presented a letter from Mr. H. D. Eaton, president of the Board of Trade of Waterville, inviting the society to hold its next annual meeting in the city of Waterville. Mr. E. P. Mayo represented the Board of Trade and called attention to the attractions of Waterville as a place of meeting.

Voted, To refer the location of the next annual meeting to President Gilbert, and that he be asked to visit Waterville and look over the situation there.

Voted, To refer the time and location of holding a summer meeting to the Secretary.

As to the purchase of a farm by the State for experimental work,

Voted, That the President and Secretary be instructed to cooperate with representatives from other societies in presenting the matter to the legislature.

The matter of legislation providing for measures to suppress the brown-tail and gypsy moths and other injurious insects was considered and the following action taken:

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Voted, That the President and Secretary of this society be instructed to ask the legislature for an appropriation of $10,000 for 1907 and $10,000 for 1908, for the purposes set forth in the resolution passed at the annual meeting, also to ask such additional legislation as the situation may call for.

As to asking the State for an increased appropriation for carrying forward the work of the society the following motion was passed:

Voted, That the President and Secretary be requested to ask the legislature for an additional appropriation of $500.

The treasurer presented his bond and it was approved.

AUGUSTA, March 28, 1907.

President Gilbert announced an invitation from the Gardiner Board of Trade and other organizations and citizens to hold the annual meeting in the city of Gardiner.

President Gilbert reported his visit to Waterville in connection with the invitation from the Board of Trade there.

President Gilbert, Mr. Wheeler and the Secretary visited Gardiner to look over the situation there, and on their report it was

Voted, To hold the annual meeting there on the week of November 11th.

The Secretary reported his visit to the meeting of delegates from the several New England Horticultural Societies held in Worcester under the auspices of the Massachusetts Fruit Growers Association.

Voted, That the Executive Committee assembled in Augusta this 28th day of March, 1907, approve the action of the society's representatives in inviting other New England Horticultural Societies to unite with them in holding a meeting for the consideration of matters of common interest to New England fruit growers, said meeting to be held in the city of Gardiner in November next as above stated.

The Secretary was designated as the delegate or representative of this society to attend such meeting.

Voted, That one of the officers be sent to one or more horticultural meetings in New England.

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In view of the proposed investment of $1,000 of the permanent fund in water bonds and the temporary use of the money received from the State,

Voted, That the treasurer be authorized to withdraw the society's deposits from the Winthrop Branch of the Augusta Trust Company and the Augusta Trust Company, as needed, to meet current expenses.

Voted, That the Secretary be instructed to arrange for two summer or field meetings if satisfactory arrangements can be made.

Voted, That the President and Secretary provide judges for annual meeting.

April 30th the Treasurer reported the purchase of two $500 bonds, Nos. 31 and 32 of the Stockton Springs Water Company, for permanent fund.

FIELD MEETINGS.

In accordance with the vote of the Executive Committee the Secretary arranged for two field meetings, one with Monmouth Grange, Monmouth, and one at Wilton, May 8th and 10th respectively.

The general subject considered at these meetings was "Injurious Insects: How to Destroy Them." In detail the matter taken up was:

Orchard conditions with reference to insects and injurious fungi.

The remedies and known results from spraying.

The insecticides and the means of applying.

Aside from the officers of the society Prof. W. M. Munson of Orono and Miss Thompson of the Agricultural Department assisted.

Several manufacturers of sprayers and insecticides were represented at the meetings.

THE ANNUAL MEETING.

The annual meeting was held in the Johnson Opera House, Gardiner, November 12-14. There was in connection with the meeting a large and attractive exhibition of fruits. The program for the meeting follows:

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PROGRAM.

TUESDAY EVENING, November 12—Opening session at 7.30. Invocation, Rev. L. H. Clarke, Gardiner; Address of Welcome, Mayor Will C. Atkins, Gardiner; Response, Wm. Craig of Auburn; Address of President, Z. A. Gilbert, North Greene; Reports of Officers: Secretary, Treasurer, Executive Committee; Member of Experiment Station Council, Chas. S. Pope, Manchester.

WEDNESDAY FORENOON—Standing of the Insect Invasion and Condition of our Orchards, Prof. E. F. Hitchings, State Entomologist; Discussion; Non-Parasitic Diseases of Fruit Trees, Prof. W. J. Morse, Orono; Discussion.

WEDNESDAY AFTERNOON—Fruit Growing at Oaklands, Robert H. Gardiner, Esq., Gardiner; Home Storage for Fruit, T. L. Kinney, South Hero, Vt.; Discussion; Maine Fruit as It Appears to Others, A. A. Hixon, Secretary Worcester County Hort. Society, Worcester, Mass.; Discussion.

WEDNESDAY EVENING—Banquet, A. O. U. W. Hall, opposite Johnson House, 8 o'clock.

THURSDAY MORNING—Election of Officers; Reception Meeting; The State Agricultural Department, Hon. A. W. Gilman, Commissioner of Agriculture, Augusta; The Grange Co-operative Company, W. T. Guptill, Topsham, Treasurer. Others are expected to be present representing other horticultural societies and kindred organizations.

Round Table—The Size of the Apple Package: The Barrel, F. H. Morse, Waterford; Discussion opened by F. D. Cummings, Portland; The Box, Discussion opened by E. L. Lincoln, Wayne; A Maine Cranberry Bog, G. D. Libbey, Gardiner.

THURSDAY AFTERNOON—Delegates' Meeting; Resolve passed at the Annual Meeting in 1905:

That this Society, recognizing the substantial growth of our fruit industry and realizing the necessity for a more critical grading of the stock, for the protection of the grower, declares in favor of national legislation looking to a Fruit Marks Act, and authorizes the appointment of a committee whose duty it shall be to correspond with the officers of the Fruit Growers' Associations in the several states, and if a general sentiment is

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found favoring such action to arrange a conference for the purpose of outlining national legislation, said committee to be authorized to expend a sum not to exceed fifty dollars for postage and necessary printing and expenses, a full report to be made at the next annual session of this Society.

Resolve passed at Annual Meeting in 1906:

That this Society recognizing the importance of the proposed measures looking to legislation which will insure more uniform sorting, grading and packing of our fruit crops, and the work of the special committee appointed last year, hereby declares in favor of continuing said committee another year in the hope that national legislation may be made certain.

Report of Committee on above Resolutions, Dr. Geo. M. Twitchell, Auburn, *Committee;* Discussion, Wilfrid Wheeler, Concord, Mass., Chairman, Committee on Fruits, Mass. Hort. Society; T. L. Kenney, South Hero, Vt., President of Vermont Horticultural Society; A. A. Hixon, Worcester, Mass., Secretary Worcester County Horticultural Society; Edwin H. Burlingame, Providence, R. I., representing R. I. Horticultural Society; John W. Clark, North Hadley, Mass., representing Mass. Fruit Growers Association.

THURSDAY EVENING—Music; Opportunities for Young People, Prof. Fred W. Card, Pennsylvania; Music; Insects, Birds and Fruits, Prin. W. L. Powers, Gardiner; Music.

The local committee representing the Board of Trade consisted of the following named gentlemen: Mayor Will C. Atkins, C. A. Knight, E. L. Bussell, F. E. Boston, R. H. Gardiner, Guy A. Hildreth.

Before the close of the opening session the following committees were appointed by the President:

On President's address and other papers: William Craig, Dr. E. P. Turner and R. H. Gardiner.

On resolutions: S. G. Shurtleff, Charles S. Pope and J. Merrill Lord.

At the annual business meeting the President appointed Charles S. Phinney, W. J. Ricker and Will E. Leland a committee to receive, assort and count the ballots for the several officers.

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Balloted and made choice of the following officers for 1908: William Craig, Auburn, president; Edward L. White, Bowdoinham, and F. H. Morse, Waterford, vice-presidents; William J. Ricker, Turner, secretary; E. L. Lincoln, Wayne, treasurer; Will E. Leland, member of executive committee for three years.

TRUSTEES.

Androscoggin county—Silas A Shaw, Auburn.
Aroostook county—Edward Tarr, Mapleton.
Cumberland county—John W. True, New Gloucester.
Franklin county—E. E. Hardy, Farmington, R. F. D.
Hancock county—William H. Miller, Bar Harbor.
Kennebec county—E. R. Mayo, Hallowell.
Knox county—Alonzo Butler, Union.
Lincoln county—H. J. A. Simmons, Waldoboro.
Oxford county—W. H. Allen, Buckfield.
Penobscot county—Samuel L. Boardman, Bangor.
Piscataquis county—C. C. Dunham, Foxcroft.
Sagadahoc county—J. H. King, Bowdoinham.
Somerset county—Frank E. Nowell, Fairfield.
Waldo county—Fred Atwood, Winterport.
Washington county—D. W. Campbell, Cherryfield.
York county—J. Merrill Lord, Kezar Falls.

Chas. S. Pope, Manchester, member of Experiment Station Council.

Voted, That our delegate to the coming conference be requested to ask the delegates to consider and agree if possible, upon an apple box of uniform style for the New England States.

NATIONAL APPLE DAY.

The following letter from Mr. James Handly, secretary of the Mississippi Valley Apple Growers Association was presented to the meeting and referred to the committee on President's address and other papers.

QUINCY, ILL., November 11, 1907.

To the Officers and Members of the Maine State Pomological Society:

GENTLEMEN:—As a representative of one of the largest and most prominent fruit growers' organization in the Middle West

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I desire to waft my heartiest congratulations to your annual meeting and exhibition, hoping both will be highly successful, not only very profitable to all in attendance, but that the light of information gained on the occasion may be radiated to the advantage of fruit growers in all parts of your state.

It can not be claimed that I appear as a guest unbidden to your feast of good things, as through the courtesy of your secretary I received an invitation to the meeting, and have only the sincerest regrets that circumstances over which I have no control prevent my attendance. I beg your indulgence, however, in submitting a proposition by letter, which I am prevented from presenting in person, relating to my favorite topic National Apple Day. It has not been quite three years since this movement was placed before the people, but in that short while it has made its force felt in all of the apple producing regions in the country. California, which was inclined to make light of the measure at the start, having witnessed its good effect, has imitated the measure by starting a National Orange Day, to be observed on the 1st day of March each year.

The reception given to National Apple Day in the New England States has been most gratifying. There has been an intelligent spirit manifested towards the event there, which has made me feel quite proud of the honor of having been born in New England. My object in addressing you at the present time is to ascertain if you have taken formal action in placing it on record that you heartily approved of the third Tuesday in October to be observed annually and perpetually as National Apple Day.

So far as I have learned, all of the New England States, with perhaps the exception of Maine, have taken this formal action through their horticultural societies and kindred organizations, and possibly your state may have done so. If, perchance, you have not, we of the Middle West, and other parts of the Union, who have taken the stand referred to, would be greatly obliged if you would adopt a simple resolution of having the third Tuesday in October observed annually and perpetually as National Apple Day. It is to be hoped that during the coming year we can have the day placed on the calendar to be generally observed. It is not necessary to say that there is not the slightest intention of making a new holiday, the purpose being to have the day as an occasion for concentrated thought and action all over the

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country in the promotion of the apple industry. It is to be hoped that such means will lighten the way to the preventing serious mistakes of the past, and for developing greater possibilities, than have yet been conceived, for the future.

May I ask your indulgence still further for calling your attention to the fact that there is a general movement now sweeping all over the country in favor of adopting the apple blossom as our national flower. We believe that this beautiful blossom would adorn the position as a national emblem, and would form a binding union wherever it would be recognized, in bringing a vast multitude of people together, who come in touch or contact in some of the diversified circles of the apple industry. The blossom as an emblem would represent not only the fruits of the orchard, but the fruits of our commerce, and the fruits of labor in diversified and far reaching spheres of industry.

Many national organizations have pronounced decidedly in favor of this choice for our national emblem, and many states, including your sister Connecticut, have heartily concurred in such expressions. Again expressing my best wishes for your society, I beg to remain,

Yours truly,

JAMES HANDLY, *Secretary.*

REPORTS OF COMMITTEES.

On President's Address and Other Papers.

First, that we endorse and emphasize the idea of cold storage so that the farmers may not be forced to sell their product before markets are in a satisfactory condition.

Second, the absolute necessity of more cultivation in order to produce a higher and superior class of fruit. We also sustain him in his assertion that more care be exercised in the selection of the highest grade of best flavored fruit, such as McIntosh rather than the Ben Davis.

We the undersigned comprising the committee on resolutions express our regret that Mr. James Handly, secretary Mississippi Valley Apple Growers Association, was unable to be with us at this meeting and take occasion to endorse his suggestion of having a National Apple Day in Maine. Not as a national holiday but as an occasion for concentrated thought and action all over

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the country in the promotion of the apple industry. The idea also of substituting the apple blossom for the goldenrod we believe to be a good one and strongly advise an adoption to such a motion.

WM. CRAIG,
DR. E. P. TURNER,
R. H. GARDINER.
Committee.

On Resolutions.

Resolved, That the Maine Pomological Society desires to extend their thanks to the Gardiner Board of Trade for their cordial invitation to hold the present annual session in this city. This society in particular desires to express its appreciation of the services of Mr. A. E, Andrews for his indefatigable services in contributing in many ways to the success of this meeting; also to Mayor Atkins, to Mr. F. H. Goodrich, and the proprietor of the Johnson House for their efforts to make our stay in this place exceedingly pleasant.

Resolved, That this society, recognizing the life-long services of retiring President Z. A. Gilbert and retiring Secretary D. H. Knowlton both as individuals and officials, their devotion to our fruit interests and their labors for the advancement of those interests, desires to express in the most emphatic manner appreciation of their services, and that the society here and now would record its sense of obligation for the great good resulting from their devoted toil and sacrifice.

S. G. SHURTLEFF,
CHAS. S. POPE,
Committee.

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PAPERS, ADDRESSES AND DISCUSSIONS OFFERED AT VARIOUS MEETINGS OF THE SOCIETY.

INVOCATION.

Rev. L. H. CLARKE, Gardiner.

Our Heavenly Father, we ask Thy blessing upon this gathering. As we come together bringing with us the first fruits of the fields may it be that these shall fill our minds with holy suggestions, may they be to us as a sweet song which awakens the highest emotions of the heart, by their perfection of beauty, sweetness of fragrance and richness of substance, teaching us of Thy unbounded resource of worth and glory, power and love. While we consider the principles and methods of agriculture may we feel Thy presence among us. We pray that this presence of Thine may inspire us to recognize the true place which the husbandman should occupy in society. May we feel that in this age of wonderful development agriculture is still as in the days gone by the basic pursuit of mankind and that it demands of men the highest degree of culture of mind, purity of heart and earnestness of endeavor to hold it in its enthroned position. May it be a call of God to the farmer not only to produce bountiful harvests but to discover the untold wealth of new harvests, to reveal new products, bringing out of God's treasure house things new as well as old. To this end may Thy blessing be upon the Pomological Society of the State. Quicken this organization that it may be Thy servant, that it may bless society, that it may make the husbandman a prince of God, a man not only endowed with the power to produce wealth but a man of highest moral and spiritual strength, one sufficient to sustain society with the sustaining harvests from the broad fields and vineyards, as well as one able to instill into the decaying elements

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of society new life and vigor. Help us to know that if the call of husbandry is to be heard and heeded in this present time, as an occupation it must be adorned with becoming attractiveness, aye, with more becoming attractiveness than other occupations for the occupation is more than other occupations and means more to society. Let the farmer recognize his true privilege in society and thus worthily deport himself. Help him to feel, O, God, that he is a fellow worker with Thee, for the accomplishment of Thy purposes in the earth. Help him to feel that the country is the hearthstone of God and that here must be purity, culture, grace and strength. Help him to aspire to exert these virtues through society as a whole, so that the remotest regions may feel their quickening impulse.

May the avenues through which these virtues shall flow be those expressions of our common citizenship which elevate men and free them from oppression or handicap. May the busy marts of trade feel that the husbandman, strong, refined, intelligent and just insists upon equal rights for all. Bless to Thine own glorious ends the deliberations of this convention and Thine shall be the glory and the honor forever. Amen.

ADDRESS OF WELCOME.

By Mayor WILL C. ATKINS.

It is with great pleasure that I, as the chief executive of this city, greet the members and friends of this, the oldest society in existence. If history serves me right and my memory be not faulty, Adam and Eve were the original promoters of the parent organization, and the place of meeting was in the Garden of Eden. Those two people were much interested in the disposition if not the cultivation of fruits and while at that time the product of the trees might be bartered or sold, it could not be eaten. I understand that the ban against eating has been removed by this society, in fact that the society not only permits eating, but especially encourages it particularly when the crop is large. My mother being the daughter of a farmer and fruit grower, makes me a half pomologist by descent, so that I have a very kindly feeling for this society.

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Possibly this may be the first visit of many of you to Gardiner, and that being the case, perhaps a few words of description may not be amiss. Gardiner was founded in the year 1754 by Dr. Sylvester Gardiner from whom the place takes its name. Direct descendants of the first family have lived with us ever since. The beautiful park or common as we call it, was given to us by Mr. Gardiner, and if you desire to see one of the finest estates in New England, I would advise you to catch a glimpse of the Gardiner Mansion, its orchards and grounds.

The city now has a population of about 6,000, is at the head of navigation on the Kennebec, and one of the busiest manufacturing places in the State. The principal industries are paper and shoe making and the manufacture of lumber. If any of you feel interested in either of these branches of business, I am sure the different concerns will feel honored with a visit and will see that you have opportunity to inspect the entire plants.

Gardiner has many churches, and they might all be worthy of inspection, but you ought not to go away until you have seen Christ Episcopal Church and the new Christian Science Church. The first should be observed on account of its construction, age and history, and the latter because it is the first Christian Science Church erected in this State.

The National Home at Togus is but twenty minutes ride from Randolph, across the bridge, and there will be seen between two and three thousand of the nation's former defenders. The governor of the Home is Gen. Richards, a citizen of Gardiner.

We have always been the legitimate rival to Augusta and while we do not equal her in population or wealth, we are somewhat like a little man out in New York state. In that state, when a woman signs a deed releasing her right of dower in real estate, she is taken into a room separate from her husband and there the magistrate asks her if she signs the deed of her own free will and accord and without fear of bodily harm from her husband. I happened to be in one of the offices of a lawyer there when in came a rather peculiar couple, evidently man and wife. The man weighed about 100 and the woman about 300. They made known their business, which was that of executing a deed, and after the man had signed, the magistrate took the wife into a side room but with the door open. He asked her if she signed the deed of her own free will and accord and without

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fear of bodily harm from her husband, and she said, "What, that little cuss over there?" And that is pretty much our relation with the Capitol city.

We give you a hearty welcome to our city. We do not as in the time honored custom, give you the keys, but we have unlocked the doors and thrown the keys away. But one condition is attached to our hospitality, and that is, you must promise to come again.

Take a good look around and when you come again in three, five or ten years from now, as sure as large aches from little toe-corns grow, we will show you a greater and a grander Gardiner.

In closing, Mr. Chairman, I wish to express to you my regret that Mr. Patten, former president of the Board of Trade, and by whose invitation you are here, was taken from this life in September. He was most interested in your visit and would have enjoyed meeting you as I know you would have been glad to meet him. He was big hearted, generous, and endowed with the finest disposition imaginable. He would have tried to do much more for your entertainment than we have been able to do.

RESPONSE TO ADDRESS OF WELCOME.

By William Craig of Auburn.

I have had the wind knocked out of me by being asked to respond to this address of welcome. For a rustic farmer, who has been accustomed to milking cows and working on stone piles and doing manual labor, it is a pretty difficult thing, without warning, to be called upon to respond to an address of that kind.

I congratulate the city on possessing a mayor with such good looks, and who has given us such a warm welcome that we cannot help but feel at home and look forward to a profitable and interesting convention.

I commend the idea of opening a convention of this kind with prayer. And I would also suggest that we mix more sentiment in with our work along these horticultural lines. A man embued with a love for his calling, realizing the extreme delicacy of what we might call a real ball of cells, will handle fruit very carefully, instead of throwing it into the baskets as is usually done.

I would again thank the mayor for his welcome.

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ANNUAL ADDRESS.

By Hon. Z. A. GILBERT, North Greene, President of Maine State Pomological Society.

The State Pomological Society was organized in 1873. A society of long standing, like a man of advanced years, can look back over the field of its activity, and pass in review the steps of progress in its pathway as the impressions have been left along the passing years of its labors. It was the privilege of your present executive head to be "in at the bornin'" of this society, and it has been his pleasure to keep in touch with every step of its work, and note every milestone of advancement it has set up along its way to the present time.

Great changes in the condition and standing of the fruit industry of our State have taken place in the years represented by the life of this society, in all of which the society has had a part. At the time of our organization the export outlet for fruit had just begun to attract the attention of fruit growers in York state. Our trade was chiefly confined to our own cities and occasional small shipments to Boston. A few individuals could see greater things for the fruit industry of our State. It is distinctly remembered that an optimistic member of the executive board of this society publicly expressed his belief that if the fruit production of the State could be quadrupled the demand for the same would be sharper than for the fruit then being grown, and in their deliberations the officers queried whether the business could ever become extensive enough to attract representatives of those foreign business houses engaged in the fruit trade to our own orchards. Such ideas, then only dreams, have come to be realities, so that now there is hardly a neighborhood of fruit growers in the State but is annually canvassed by agents from Liverpool and Glasgow in the interests of the foreign trade in our Maine grown fruit. These conditions fittingly represent the increase in fruit growing in our State since this society was organized in its aid, and in the development of which it has held an active part. Yes, and this society is clearly seeing the opportunity for a still greater development of the industry in the near future than has been its history in the past.

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COLD STORAGE.

The orchards in our State have already outgrown the provisions for caring for and handling the fruit after grown. The crop of marketable apples just harvested in our State is estimated to exceed two million barrels. In a single town it exceeds fifty thousand barrels, a single county approximates a half million barrels, and individual orchards have reached the plural thousand. These quantities call for room after taken from the trees. Yet there is not a rental storage house in the State, and the private store-rooms constructed for this purpose can be numbered by the digits on one hand with the fingers uncounted. Thousands of barrels of this choice fruit was of necessity temporarily stored in barns, sheds and other outbuildings, and thousands hastened to market on reduced values, and still others frozen on the trees and lost, all for the want of provisions for quick and safe storage facilities. This must not continue if we would encourage the further planting of trees. What the business now first of all calls for is a cold storage warehouse at Portland to which fruit can be forwarded direct from the orchard, and held till called for by market demand. Possibly cold storage and shipping centers on the line of the railroads may meet the demand of the business, and it needs no argument to show that private facilities for temporary storage are a necessity on every fruit farm.

This is a matter calling for action rather than recommendation. This society can at this stage of conditions surrounding our fruit interest do no better service than to aid in establishing storage facilities adequate to the needs of the fruit crop. Fruit interests have reached a stage where something different is called for other than planting more trees.

CULTURE.

For several years this society has been doing valiant service to the fruit interests of the State through its urgent appeals for better care and culture of the trees. One has only to go through any fruit growing section of the State to find the evidence that this teaching has been heeded in goodly measure. Indeed no small measure of the bounty of the crop just harvested was due to the influence sent abroad through the agency of this society.

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But the call for further work is still abroad. There are still more trees than fruit in the State. Your President has gained some lessons in the last three years that had he learned them earlier in life would have been greatly to his advantage. Others need these lessons. It is not the purpose at this time to discuss how this needed culture is best applied, but to urge continued attention to this important feature of successful fruit growing. In the past years good crops of fruit have been realized when nature got into a friendly mood and gave us the benefit of her good fellowship. In the late harvest note what the "tender" Baldwin has given, in return for intelligent care bestowed, in scores and hundreds of orchards, following one of the coldest winters on record; the fruit on a short acre of Northern Spy trees, sold on the trees for six hundred dollars; fail not to take into account the scores of other bountiful crops you will learn of at this gathering, and then remember we have but just begun to realize the opportunity open to us in our goodly State for continued successful fruit production. While we have made vast strides, as a society, the hand of possibilities is beckoning to us even more earnestly today than when we first took the responsibility into our hands to lead the way to the still greater achievements now plainly within our reach.

VARIETIES.

The question of varieties to plant will not down with the bidding so long as there are continuous enlistments of new recruits to the ranks of tree planters. This is today, as in the past, a matter of vital importance to the industry. Your President is on record in claiming that superior quality of the fruit is the leading factor of value and therefore never should be omitted from the calculation in deciding the question of variety to plant. We have had a Ben Davis lesson the past winter. Another chapter will be given at this meeting. The present system of selling trees has a possible trend toward misleading in this dominant factor of quality. The business of the tree salesman is to sell trees. It is as natural as breathing that a salesman will fall into line in recommending the kind that is selling freely. Usually this is a variety the genuine merits of which are little known. Thus it is that good, old fashioned varieties that have formerly proved their merits in our own State get overlooked,

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MAINE FARMER PRESS, AUGUSTA

T. L. Kinney's orchard, South Hero, Vt.

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and the new generation of buyers and planters know nothing of them. A grower in our State of the old and almost forgotten Williams Early has been selling them the past summer at three dollars the bushel box. Another grower has been selling the Gravenstein in quantity at two dollars and fifty cents a box. This society has yet a responsibility on its hands of disseminating information in regard to varieties of apples to grow. The influence of the tree agent is too prominent.

Thus it is seen there is work still opening to view as step after step we advance to higher standards of success in the chosen work we have in hand and as the light of knowledge points the way. Thus should it ever be, as advancing knowledge opens to the broader view a field of effort whose limit can never be compassed.

GREETING.

We are to have with us at this session representatives from kindred organizations throughout the New England group of states. Situated as are these sister states we are one in interest, and may well be a unit of effort in behalf of that common interest. This new movement cannot fail of a strong influence towards centering thought, awakening interest and arousing effort in a warmer love of nature as exemplified in fruits and flowers and will aid in embellishing country life with the useful and the beautiful so lavishly laid before all who have eyes cultured to see and the taste to enjoy the entrancing bounty. As co-workers in our chosen field of effort we extend the glad hand to the delegates and visitors from kindred societies from other states, and assure them a warm welcome to our deliberations.

Your President congratulates all associate fruit growers wherever located over the surprising bounty that has rewarded their efforts the past season.

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NON-PARASITIC DISEASES OF FRUIT TREES.

By Prof. W. J. Morse, Orono.

Some time ago your secretary wrote me requesting that I come to this meeting prepared to speak on the diseases of trees. Since it seemed to me impossible to do justice to so general a topic in the time allotted, I suggested that the discussion be limited to the non-parasitic diseases of fruit trees. When I came to go over the matter in detail I felt the need of still greater limitation. Just at present our orchardists are much interested in winter killing of fruit trees, therefore, I think you will pardon me if I limit what I have to say largely to those diseases which are brought about by adverse weather conditions, and particularly to those due to extremes of heat and cold in winter.

Any condition which interferes with the normal activities of a plant and renders it partially or wholly incapable of responding to its environment is a disease. We should bear in mind that there is a sharp distinction between the cause of the disease and the disease itself. The fungus in plum pockets is not the disease, but its presence in the tissues of the host stimulates them to abnormal activities and the large bladdery "pockets" are produced in place of the normal fruit. Similarly the hired man is not a disease (though we sometimes look upon him as an affliction) but by carelessly driving his team in the orchard he may be responsible for a diseased condition resulting from barking and wounding the trees.

While some may object to my definition of a disease, if we accept it we see that diseases resulting from non-parasitic agencies are common. These are largely due to the action of the non-living environment, such as conditions of soil, moisture, atmosphere, heat, light, lightning, etc. I will briefly mention a few of these diseased conditions resulting from extremes of temperature.

Sun scald is a trouble which is apt to take place in mid-summer on the south of young, thin barked trees, and is due to over heating and drying out from bright sunlight. Also in late winter and early spring, when the rays of the sun on the south and southwest sides of the trees cause an alternate freezing and thawing, the tissues beneath the bark are killed in patches, the

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bark sinks, dries out and finally separates from the wood giving much the same injury as in the summer sun scald. With some trees, especially cherries, we have a blistering and cracking of the bark. It is more common west than in New England and more apt to occur on high headed trees with exposed trunks. The remedy is to protect the trunks of susceptible trees by shading.

Low temperatures, or, rather more frequently, alternately freezing and thawing is responsible for more injuries to fruit trees than high temperature. Late frosts in the spring may produce a blistering of the leaves, and very frequently cause what is called "frost band" of apples and pears. This latter is very frequent in some parts of New England. A late frost catches the young fruit soon after it is set but does not injure it enough to cause it to fall. When the fruit enlarges there is a distinct and often very marked russeted band around it half way between the stem and blossom ends. Bordeaux mixture may also cause a russeting of the fruit but this occurs in blotches and patches, and not in well marked rings.

Frost cracks are more common on the trunks of certain forest trees than on fruit trees. Very low temperatures, especially if accompanied by a cold, dry wind causes the tissues of the wood to shrink. The wood and bark split in long cracks along the more exposed side. Once opened the crack may split open repeatedly, winter after winter, and yearly attempts to heal may result in a well defined ridge along the trunk, called a frost ridge.

Frost patches are very characteristic upon winter killed or winter injured trees, more especially on the larger and medium sized limbs. On badly frosted trees the bark on the smaller limbs is apt to be pretty generally killed. These frost patches on the larger limbs can be seen early in the season following the injury and are prominent all summer. There is a sharp line on the surface of the bark marking the junction of the dead and the living tissues. As the dead bark dries out the tissues contract and stick to the wood below. The bark very frequently is of a lighter color and may crack away slightly from the healthy portion. The patches are of various sizes but are generally elongated in shape. If the tree is not entirely killed, healing of the wound is started but instead of forming a callus with a thick

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lip on the margin as in the case of canker or a mechanical wound the new living tissue is forced with thinned out edges between the wood and the dead bark. Patches like these offer an excellent opportunity for the entrance of fungi. In fact those formed last winter show today almost without exception more or less infection and if one has not followed the history of the case there is considerable chance of being misled as to the cause. The natural inference would be that the fungi are the original and only causes of the dead areas. However, if the fungi are allowed to develop they may eventually cause the final destruction of the trees, therefore, prompt remedial measures should be taken. As soon as the frost patches are apparent in the spring the bark should be cut away till the healthy margins are exposed and the wound covered with a coat of white lead or thin grafting wax. In an orchard where this has not been done I would now wait until just about the time growth begins in the spring and make a pretty thorough job of getting rid of all tissues which show signs of decay.

There is some difference of opinion as to how severe pruning we should do on badly injured trees. Personally I think I would prune rather sparingly the first season but during the next winter or early spring I would cut out all dead wood going well back on the living tissues, to be sure that all infesting fungi are removed. Of course, this dead wood should at once be burned to destroy the fungi contained therein. In many cases top grafting may be used to advantage.

In the history of Maine orcharding we probably have had no other single season in which so many fruit trees were killed as in the winter of 1906-7. This was due, as I shall attempt to show, to the severity of the weather and the abrupt fluctuation of temperature from extreme cold to thawing. However, we have good reason to believe that many trees were more susceptible on account of not having fully recovered from the freezing of 1903-4 and 1904-5, for I find the following statement from Professor Munson's pen: "The winters of 1903-4 and 1904-5 were exceptionally severe in Maine, and as a result many complaints were made that the apple orchards had suffered more than for the previous 20 years."

The injurious effects of a winter like that of 1906-7 are more easily understood if we know something of the structure of a

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tree. If we should cut a thin section from a leaf, a stem or root and examine it with a microscope we would find that instead of being solid it presents a honeycombed appearance. We would at once see that the plant tissues are made up of different individual units of various shapes and sizes. Furthermore, in each separate organ, the shape, size, structure and arrangement of these units are modified to serve some special purpose. For example, in the leaf they have thin walls, are more nearly rectangular, and are arranged with open spaces like a loosely piled stone wall. In the stem of woody trees the different elements are arranged in a circle and many of them are thick walled, very long and tapering with the ends over-lapping and fitting tightly together, thus giving strength to the tree. Others have lost their end walls and form tubes or vessels to conduct liquids up through the stem to the leaves. These separate units are called cells and each cell of a plant is more or less dependent on other cells for its life and well being.

The simplest form of a vegetable cell has a wall made up of a substance known as cellulose. Chemically this is practically the same as starch but in structure it is in reality quite different, as will be seen when I tell you that the best filter paper used by chemists is nearly pure cellulose. It absorbs water very readily and readily allows water to pass through it. On the other hand, when wet, as it always is in the active cells, it retards the passage of air or gases unless in solution much the same way as we have all seen a wet sheet enclose and retain bubbles of air when in a wash tub.

The cell wall may be variously modified as the tree grows older, those of the trunk becoming very thick and woody. Those of the bark receive deposits of cork and the cells finally become minute, tight, thick-walled cork boxes, each containing a little bubble of air and forming an admirable non-conductor to protect the tissues below from extremes of temperature without. Lining the inside wall of all living vegetable cells is a thin layer of a semifluid, viscid substance called protoplasm and imbedded in it or suspended in the interior of the cell by strands of protoplasm is a body called the nucleus. The protoplasm is the seat life in the cell and the nucleus probably controls the vital activities of the protoplasm. The cell cavity within the film of protoplasm is filled with the watery cell sap, and bubbles

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of gas or air. The gas content of the wood on some trees being as high as 20 to 25 per cent of its volume. The film of protoplasm, like the cell wall, allows water to pass through it but it can regulate in a great measure the passage of the soluble cell contents. If, however, this living matter is killed, for example by frost, the cell sap readily passes through it and escapes. This makes the tissues soft and flabby as is the case with frozen leaves of tender plants.

In a tree like the apple or pear, the living, active cells are largely confined to the outer layers of the wood and inner layers of the bark. Most of those in the interior contain no living protoplasm and are functionless except as they assist in supporting the trunk and in the transference of liquids. The region of growth in the tree, as we all know, is at the junction of the bark and wood. This is known as the cambium zone. During the growing season the cells of the cambium layer grow rapidly and are actively dividing, forming wood on one side and bark on the other. The wood formed in any one season from this division produces the well marked annual ring which we all recognize. If anything happens to destroy the living cells in the cambium zone, growth stops there, the bark dries down or sloughs off and we have an exposed surface or wound inviting the entrance of wood decaying fungi into the tissues below.

Before leaving the question of structure we should point out those elements which are concerned in the transference of food materials and foods in the tree, for this throws light upon certain phenomena observed with reference to frost injured trees Mineral food substances dissolved in water are absorbed by the fine hairs near the ends of the minute rootlets, then carried up through the roots to the stem where they pass upward through the vessels of the wood inside the cambium zone to the leaves. Here they mingle with the gases taken up from the air and are converted into starch and other food materials by the protoplasm of the leaf cells, acted upon by sunlight. Then these manufactured food materials are sent back down to furnish nourishment to the growing parts of the trees. But instead of going down through the wood they pass down through certain vessels in the inner part of what we commonly call the bark, next to the cambium. The downward course of the manufactured food materials is easily demonstrated, for every orchardist is familiar with the

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effect produced by ringing or partially ringing the tree. Growth goes on above the ring but stops below for the food supply is entirely cut off.

Not all the manufactured food is used at once for growth but some of it is stored away in the tissues of the stem and root for future use. This is especially true toward fall when the wood is "ripening up," as we say for winter. Then the tree is actively storing up food material, largely in the form of starch to be used the following spring. In the early spring, the food materials begin to go into solution again, pass up through the vessels with the water current and are used in building up the young leaves till thy are ready to go into the food manufacturing business on their own account.

After a severe winter we are sure of a large number of bundles of apple twigs to examine during May and June. The owner in each case is very much alarmed, saying that some unknown contagious disease has appeared in his orchard and is sweeping through it like wildfire. In some cases the trees fail to put forth leaves at all. With these trees the orchardists readily recognize that they have winter killed. More often the leaves appear as usual and frequently blossoms are also put forth. In less severe cases the fruit sometimes sets. Suddenly the leaves begin to wither and fall off and the bark on many of the younger limbs and twigs withers and dries out. Bearing in mind what has just been said with reference to the structure of the tree and the storage and movements of food materials the explanation of the cause is now easy.

When the ground begins to warm up in the spring the sap current from the roots starts up through the vessels of the wood through the trunk, limbs and twigs to the buds. The dormant buds on the trees are quite well protected from frost and apparently can withstand greater variations in temperature than the smaller limbs. The stored food materials go into solution and are carried along with the water current, the buds swell and begin to put forth leaves as usual. If the frost injury is not severe the trees will have a sickly appearance for a season or two and may gradually recover unless another cold winter follows to finish them. More frequently the leaves fall as has already been described. Here we have stored food materials sufficient to start the young leaves, but this soon gives out. So many of

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the living cells in the outer tissues of the young limbs have been killed that they cannot perform their proper function and death results, either to a part or a whole of the tree, depending on how many of the limbs are badly affected.

There is always an upper and a lower limit of temperature that a given species can withstand. Some tropical plants are killed at a temperature of from +35 degrees to +40 degrees F. while some arctic plants have been known to withstand —60 degrees to —70 degrees F. Our experience during the past season with apple trees shows us that this minimum limit varies with the variety and with the individuals of a given species or variety. When we get down to —30 degrees or —40 degrees F. we have come within the danger limit for most varieties of the apple. Last winter the records at Orono show that we reached this limit in January twice within a few days of each other.

When a tree freezes water is withdrawn from the cell walls and cell sap and forms in crystals in the intercellular spaces or in the interior of the vessels, hence the cell walls become much dryer, and the cell contents, even though they do not freeze themselves, become more concentrated,—a condition similar to drought. If now thawing gradually takes place the water is reabsorbed slowly and the vital functions of the cells are renewed. If on the other hand the frozen tissues are rapidly warmed and the water quickly liberated trouble is sure to follow, just the same as will be the case if the small boy thaws his frosted ears by the kitchen stove instead of using the time honored snowball.

Before attempting to fix just *how* and *when* our trees were killed last winter, let me quote three sentences from one and one from another of the best German authorities on this subject, the latter a specialist in the diseases of trees.

1. "Thawing is more dangerous than freezing, as, if it proceeds too rapidly, it kills more plants and plant parts than extreme cold."

2. "Those parts of plants that contain little water are particularly endowed with the power to withstand cold."

3. "Death from cold is undoubtedly in very many cases a result of want (withdrawal or loss) of water and not of low temperature."

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4. "The injurious effects of repeated thawing and freezing, long continued frost, or strong drying winds are to be explained by the scarcity of water that results from the interrupted or at least reduced passage of water."

It may seem on first thought that the second statement is a direct contradiction to the third, but it will be seen that one means the absence of water before the frost while the other means the loss of water from the tissues resulting from freezing.

Now let us look to the weather record for January, 1907, as taken at Orono. Out of 23 days following January 8 there were only two in which the temperature rose above the freezing point. January 17 with a maximum of —3 degrees F. and a minimum of —40 degrees F. or 72 degrees below the freezing point and January 24 with a maximum of +9 degrees F. and a minimum of —35 degrees F. or 67 degrees below freezing furnish the extreme low temperature conditions. Think of the conditions of the cell with regard to moisture in the 7 days following the —35 degrees F. record on January 24. Not a maximum over +24 and a minimum varying from 0 degrees F. to —24 degrees F. or from 32 degrees to 56 degrees below the freezing point of water. By this time they must have been as dry as the proverbial bone. Nor is this the entire story. Let us look to the two exceptions in the period already noted, where the temperature did go above the freezing point. We find these to be together, exactly midway between the two lowest records, giving us the two highest and the two lowest records in the month occurring within eight days. From —40 degrees F on the 17th we jump 85 degrees to +45 degrees F. on the 20th. From +47 degrees F. on the 21st we drop 82 degrees to —35 degrees F. on the 24th, followed by the week of low temperature already mentioned. A little closer inspection of the change from severe cold to thawing weather shows that it was moreover quite abrupt. Since the daily observation is made at 2 P. M. the minimum record would ordinarily represent the preceding night, or most frequently just before sunrise on the day of the record. Starting with the 17th we have a minimum of —40 degrees F. and no time during the day did the temperature go above —3 degrees F. On the 18th the highest record was only +11 degrees F. Before the morning of the 19th the temperature dropped again to —13 degrees F. and only reached +20 degrees F. during the

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day or still 12 degrees below freezing. Some time during the night it dropped off 2 degrees to +18 degrees F. and *by 2 o'clock on the afternoon of the 20th the temperature had risen to +45 degrees F. or 13 degrees on the thawing side. That night shows a drop of 35 degrees to +10 degrees F. Back it comes again 37 degrees to +47 degrees F. and thawing on the 21st and on the following night falling 60 degrees to —13 degrees F.* Thus we had the long continued low temperatures, the extreme low temperatures, the rapid thawing following a hard freeze, and the alternate freezing and thawing all in the month of January and the last three conditions occurring within 10 days. I need not tell the orchardists of Maine what this did to the fruit trees for they know that part of it too well, but I do believe that this record for January, 1907, shows when and how the damage was acomplished. When we remember that we have transferred the apple from the milder climate and lesser rainfall of southwestern Asia and southeastern Europe, is it strange that so many varieties succumb to the conditions I have just described? I am not so astonished because of the number killed as I am that so many survived.

But this does not explain why one variety is killed and another variety in the same orchard is not killed or why an individual is killed and another of the same variety standing beside it survives under exactly the same conditions. No doubt also some of you feel that our reasoning has been faulty for you have repeatedly seen the trees on an exposed hillside survive while those on the lower ground in the same orchard are killed. We cannot explain the difference in hardiness of varieties, or of individuals of the same variety, but I think we can explain in part, at least, why the trees in the more exposed localities stood the winter better than those on the lower ground. In the first place it is a fact well known that the cold air drains off into the valleys or pockets and that the hillsides, though more exposed, do not as a rule record so low temperatures as does the lower ground. This fact is almost always considered in locating peach orchards. The peach, as you know, being quite sensitive to frost. Secondly let me call your attention again to the sentence "Those parts of plants that contain little water are particularly endowed with the power of withstanding cold." I think we are justified from what has been said in going one step farther and

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saying that the resistance of an individual plant to cold varies, within limits, with the amount of moisture it contains at the time of the freeze, although I do not recall any experimental evidence to prove the assertion. If this is granted the application to the case is as follows: Snow fell early in November, 1906, and remained on throughout the entire winter. You will also remember that when the snow came there was no frost in the ground and except in exposed localities the soil did not freeze. The roots of trees standing on lower lands where the soil was comparatively warm were not chilled and kept forcing moisture up into the trunk thus saturating the tissues with water. On the other hand the soil underneath and the roots of the trees on the exposed localities were chilled down quite early in the season. Hence it would seem that there would be less forcing of water into these trees, the moisture content would be less, and they would not suffer so much from frost injury as the trees on lower ground.

Now, what can we do to avoid repetition of this trouble? Unfortunately we cannot control the weather and must take the bitter with the sweet. It seems hard, when a man has the results of years of work swept away just as he is about to realize profitable returns, to tell him that the loss could not be avoided. However, the experiences of the past few years have their value if applied. We should plant only those varieties which withstood the freezing or withstood it to a marked degree. If others are used it *must* be with the understanding that chances are being taken in doing so. In selecting ground for orchards we should see that it is well drained, and avoid heavy soils, low valleys and pockets. If advantage cannot be taken of natural wind breaks an artificial one should be provided on the side of the prevailing cold winds. It goes without saying that the trees should be well fertilized and cared for. However, they should not be stimulated by late cultivation to too strong and late growth in the fall so that the wood will not mature before winter sets in. Professor Munson also notes, and your Secretary emphasizes this in his report, that trees which bore heavily the summer before are more likely to be injured and recommends thinning the fruit in summer on the heavily loaded trees.

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STANDING OF THE INSECT INVASION AND CONDITION OF OUR ORCHARDS.

By Prof. E. F. HITCHINGS, State Entomologist.

As you all know, the year 1907 has been one of the most crawly years in the history of our State, or buggy, or whatever the term you might apply to it. We have had all sorts of specimens of insects sent in to the office, and I have heard them being complained of all over the State. Of course among them we find some old—shall we call them friends? no—we find insects that we have been familiar with from our childhood, lots of them, but never in such an abundance, and never have they done such damage probably in the history of the State as they have during the past year.

Now among the common insects that have infested your orchards, your shade trees, your garden, vegetables, etc., we will only refer to a few and call your attention to the exhibit here, which you can consult, and we will be glad to answer any questions in regard to these specimens here, or any others that you may wish to ask about.

We had in the spring our usual infestation of what we term the tent caterpillar. In some counties in the State that insect did a great deal of damage, especially so in York and Oxford counties. Some sections were almost free from any nests of the tent caterpillar. We had many complaints of our leaf rollers, bud moths, etc., those small, minute insects that perhaps many of you have never seen, or may not know that they have been in your orchards.

Then we had coming to us after haying caterpillars that strip young trees especially, kill them outright. I can show you one block of between three and four hundred trees dead from the effect of just the red-humped apple worm. Now the moth of this caterpillar hatches out late in the season. She lays her eggs while you are haying, or earlier than that—the caterpillars hatch while you are haying, and while you think your orchard is safe these little fellows begin their work, and by the time you get through haying, and by chance visit your young orchard, the damage has been done. I venture to say that if we could get full data from that one pest, it would be up into the thousands—

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I know it would be up into the thousands of young trees destroyed during the past summer by this one insect alone. Then to take an associate, the yellow-necked caterpillar so-called, and there were all kinds of others, the different species of the woolly bear so-called, and many other insects that were abundant this fall.

Of the railroad worm, the trypeta, in certain sections hardly an orchard has been immune from this pest. An easy remedy of course would be the cleaning up of the fallen fruit. That is the only thing to do—cleaning up and feeding out, or pasturing sheep or hogs; because, as most of you who are acquainted with this insect know, the adult is a little fly not half as large as your common house fly, and the female punctures the skin of the apple and lays her egg underneath the skin. There is no way you can spray to do any good. Now that little fellow when it reaches maturity must go into the ground and remain over winter. Common sense would tell you then that if you keep your fruit picked up before this little fellow can go into the ground, why you destroy its future career. The codling worm is easily controlled by spraying. I shall be ready at any time to answer any questions regarding any of our insect pests, but I don't want to take the time at present to speak further on these insects that are so familiar to all of you.

We do have, though, two other insects our President referred to—the brown-tail and the gypsy. I think most of you are familiar with the winter nests of the brown-tail. You may never have seen the caterpillar to recognize it, or the adult, the perfect insect. They are shown here, the whole life and work, and they will be explained. But I want to say this much about the work of the brown-tail moth in the State. The law of last winter did not go into effect until about the first of March. We could not expect to enforce the law at that late date. We tried our best to institute the educational work as far as the department was concerned, but as to compelling the private individual or town to live up to the letter of that law, we could not do it for the want of time. This year we are in hopes that we won't have to do anything further in the way of compulsion. We hope and trust that every man, woman and child in the State has an interest in this matter and will see to it not only that their own trees —orchards and shade trees—are freed of these nests during

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the coming months, but that the town officials are up to their duty in looking after the shade trees on the highways and removing these nests. In the short time last spring very effective work was done, both by the towns and by private individuals. We were very much pleased indeed to see the interest taken and the thoroughness of the work done. As a result, I think you will all agree with me that you do not find many brown-tail nests in towns where there were quite a few last spring. Of course throughout the thickly settled portion—that is, thickly settled as far as the nests were concerned, or have been for the past two or three years, that is the towns in York county especially—you could find them today by the thousands. but along our northern border, through this section and further south even till you get to Portland, I think you will find that more than fifty per cent have dropped out.

We have at present eight men in this work. The work is educational. We are scouting along the northern border to see that none have escaped us—stepped over the line. That of course has to be done, and done thoroughly, because we don't want them to get by us and start in somewhere where they will not be noticed perhaps. So much for the brown-tail work.

Now I am to touch upon a chapter that I trust is an introductory chapter, and I hope there will be but one chapter following, and that is this record of the gypsy moth in our State. It has reached now such a serious condition that it appeals to every living being in Maine. I have here two new mounts of gypsy material prepared in the office a day of two ago to be presented to the Governor and Council yesterday. Dr. Howard—I will go back a little—Dr. Howard and his field agent for this work visited our State and in company with my field agent and myself we went over the territory, showing him what we had done during the past year. He expressed himself as very much gratified indeed with the work done. Now understand, I don't want you or any one not employed in this special work to touch a gypsy egg cluster in the State, not a live one. It is not safe. Last winter we had them carried around on the bottoms of sleighs and pungs and scattered all through York county. We discovered the remains of these on the bottoms of sleighs and pungs with only a few eggs left. Well, now, with an egg cluster numbering five hundred eggs, and with a vitality shown by

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experiment to be almost indestructible with common, natural means, where they have tested these eggs frozen and thawed out and frozen again up to six times in succession and then had the eggs hatch out, there is not much show for scattered eggs being killed by remaining under foot along the road, or where the horses travel, or anything of that nature. Now if you, or any other one, should go and attempt to remove an egg cluster, you might drop a half a dozen eggs easily. I would rather have a whole egg cluster of five hundred eggs than one scattered egg hatch. Why? If we had five hundred big caterpillars to look for, they would show their work; we would discover it, the infestation of the one nest possibly, while I would defy almost anybody to discover the one or two or half a dozen that had been left scattered.

Now in regard to the work of last summer, I will give you just one instance of the thoroughness of the work done. As most of you know, we have had men in the field since this law was passed last winter—the work on the gypsy confined wholly to the department—the brown-tail work, any one can cut a brown-tail nest and destroy it, and that is for you to do. But the gypsy must be handled by men trained for the work. And there is no comparison between the two. Why I have been asked many times, "Well, what is the difference between the gypsy and the brown-tail?" Now there is just as much difference as there is between the best citizen in this hall and the worst criminal down to Thomaston. That is the difference. Now these were discovered none too soon. We went to work none too soon. We have had now almost a year's experience with the gypsy here in Maine. They have been here five years or more, but we didn't know it. These men were trained in Massachusetts and then went into our work. We had the national government men first come and scout sections of the territory. One infestation was on a road which was being passed over morning and night by one of our men who was attending the burlaps at another place. He discovered by accident some caterpillars crawling across the road as he went by on his wheel. On investigation we found a very bad infestation that must have been there at least five years, estimated to number over a million full grown caterpillars, almost full grown when discovered; many of them were full grown. We at once put the

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whole force onto that infestation, used seven barrels of kerosene to spray and then set them afire. There were no trees; it was low shrubbery, sweet fern and this ground hemlock and bayberry bushes in a pasture. A stone wall lined each side of the road. They were on both sides. Such effective work was done at that time that when Dr. Howard was here he made the remark that we were doing the best work that was being done. Later on we had one of the best spies or scouts in Massachusetts come down and scout that territory around this section that we had burned. The man said that if he could afford it he would give one hundred dollars in cash if he could find a number of the gypsy egg clusters, because he wanted to prove that we didn't do good work, or that it couldn't be done; and you can imagine that he did his duty in scouting with his men. They went over the territory and went into the woods beyond and all around it and hunted and hunted everywhere, with the result of only one egg cluster under a rock way back from the territory burned. Just one egg cluster out of one million almost full grown caterpillars that were destroyed.

Now by accident, only a short time ago, one of our best scouts in passing through a wooded section of three hundred acres of forest growth discovered the egg clusters of the gypsy in abundance. We had already discovered two or three new ones, but I will simply refer to this one. I am taking too much time, but I want you to realize the importance of this and the seriousness of it, and to use your influence in every way possible to see that the work is carried on by proper means, and that some arrangement can be made whereby our appropriation will not be cut short until the work is done.

As soon as this infestation was discovered the head field agent at Boston was notified and more help asked for. We had secured eleven scouts before that from the national government. The national government has a fund for this work of $150,000 and we are entitled to a part of it, so that we secured eleven men. I went right to Boston and asked for more men and I had the promise last week of twelve more men from the government. We took all of our men and put them in with the others. Now what is the result of that new find?—these nests that I have referred to on twelve different varieties of trees. As a result of this inspection so far we have taken 2,662 egg clusters in this

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one woodland, and as near as we can judge there are two hundred acres out of three hundred acres infested. We have had nine men at work there one week. In one day they secured 865 egg clusters, and from one tree 251 egg clusters were taken.

Is that important or not? As a matter of insurance protection to our State we must stop this gypsy. There is no other way that we can do. We must do it. And we will do it if we can get the money and the men to do with. I have got to get some men and send them right to Massachusetts—have several in mind now—but we don't want any man in the work who is looking for the dollars and cents—not a man. We have had so many applications at the office from men who are no more competent to do this work than little children, and men that you could not depend upon, and yet we have had petition after petition come in, even one person going before the Governor and Council as a last resort, to get onto this work. I wouldn't have the man if the President of the United States should insist on it, if I could have anything to say about it. The first rule on my field note book says "No man addicted to intoxicating liquors shall be employed on the force." That is enough to rule out lots of the applicants. We don't intend to have a man, as I said, who is looking for the dollars and cents. We are all looking after them in one way, and it is right we should. But what I mean we don't want—there is a new word come in that is just being used and coming to the front a great deal—we hear it in connection with our pomological meetings—every man that has got an orchard uses that word sometimes, especially in the spring when he starts out with some scions in his hands. What does he do to his tree? Well, now, we don't want that word used in any connection with the gypsy or brown-tail work, and we don't intend it shall get there if we can help it. We have got to have honest work. We can't have a man on the force who will slyly put an egg cluster in his pocket and on his way home or somewhere else drop it. A man ought to be hung that will do it. And yet they do it and have done it. If you ever see a man on this force doing anything of that kind, please report. I will pay a bounty.

I will tell you our method; perhaps if I leave you just here you may think that we are up against an impossibility. Now I

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assure you I have been familiar with the work ever since its first inception in Massachusetts under the old commission, and in fact have been in close touch enough all along to know something of its history, and have had a lot to do with insect invasions—enough to know something of what can be done with an insect. Now there is one great advantage that we have with this gypsy over all other insects—almost all other—and that is the inability of the female moth to fly. I have watched them by the thousands, and if we had a tree growing up one here and one within two or three feet of it, a moth could not fly from one trunk to the other—a female moth. I have watched them where they tried even to climb up the tree they were on, and almost invariably they would lose ground and get down to the bottom and have to crawl away somewhere to lay the eggs. Now there is the advantage.

And what is our system of work in a few words? I will explain it to you so I think you will see that there is hope. It only needs the requisite number of the right kind of men, men who are honest to the core and would not scatter an egg any more than they would cut the finger off from their right hand. Those egg clusters are laid in August, we will say. They remain in that condition till the next spring. When they hatch out, the little fellows are so small you couldn't see them as they crawled up the tree—very small indeed. But by using what we call tanglefoot, putting a strip around the tree of a sticky substance to intercept those little fellows, we can catch them by the thousands as they go up in their first journey. After a little they will begin to feed, only by night and hide away through the daytime. That characteristic is in our favor, for in the infested districts we burlap the trees; that is, take a band of burlap eight inches wide, put it around the tree, tie a string round the center, turn the upper fold down, and we have a double fold right round the tree. We will have to use burlap on every road in the town of Eliot, and every road in the towns of York and Kittery probably—what I mean every tree that comes near the sides of the road where teams would pass, or the possibility of their being conveyed by that means. Now as soon as the caterpillars come down the trees in the morning to hide away from the sunlight, as they reach the burlap they crawl up under and remain there through the day. A man is detailed for just as

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many trees as he can handle through the day. That is his work. He has his note-book and keeps a tally of everything done, and he tends these burlaps and kills every caterpillar found through the season, until the caterpillars disappear and what we call the next stage, the pupæ, appear. We find many of them under the burlaps where the caterpillars come down, and which remain hanging there. The trees are scraped, the rough bark removed, and all places where they can hide covered—any holes in the trees, anything of that nature; and that is the work we do. So that it is simply the collecting, or the killing of the egg clusters now from August till the next spring; then the tanglefoot; then the burlap—and that the work we have to do.

Now in regard to this orchard business—I have just a summary of statistics from different counties, but we haven't time to go into detail, and in fact I sat up last night till after twelve o'clock and got up this morning at half past five, and then found that two or three note-books were coming by express at ten o'clock this morning. So you can imagine that there is some little work yet to be done and probably this will come out in a form that will be valuable for all of you. I think it will be of considerable value to the orchard interests of the State. I will simply in a hasty way run through some of the counties, and we will take Oxford county first.

Of the number of orchards examined and reported here I have 140 orchards. That number of orchards contained 80,350 trees, the largest orchard numbering 4,000 trees and the smallest 50 trees. In this work of course we have had to get at it in short time, but what has been done we trust has been done thoroughly. Now out of that number what trees were damaged? In Oxford county we find that the Baldwins stand first, Ben Davis second, and a few Kings reported. But 95% of all trees examined that were supposed to be winter killed during this past year were Baldwins.

Next we will take, as showing a little different condition, Somerset county. Of the 84 orchards examined, containing 36,575 trees, we found the largest orchard numbered 2,400 trees and the smallest 30 trees. In that number there were twelve orchards of more than a thousand trees. With what result? We find Baldwins, Ben Davis, Kings, Wealthy, Spy, Stark,

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different varieties of Russets, Gravenstein, Newtown Pippins, Greenings, Fallawater, Fameuse, Arctics and Alexanders, fourteen varieties.

Piscataquis county: In 93 orchards containing 22,830 trees, the largest orchard numbering 2,000 trees and the smallest 30, we find the following: Tolman Sweet, Fall Harvey, Fallawater, Pound Sweet, Nodhead, Yellow Transparent, Gano, Mildings, St. Lawrence, William's Favorite, Baldwins, Ben Davis, Starks, Red Russets, Greenings, Fameuse, Arctics, Kings, Northern Spy, Wolf River, Rolfe, Black Oxfords, Mann, Golden Russets, Peewaukee, and others, numbering twenty-five different varieties.

Now I wish I could give you the history of this work in Kennebec county. The work has been more thoroughly done in Kennebec than in any other county, but I haven't the data; all the note-books are not in, and each note-book should show about 100 orchards. But in hurriedly running over these books since ten o'clock, I find the varieties as follows: Baldwin, Ben Davis, Rhode Island Greening, Twenty Ounce, Kings, Hubbardston, Tolman, Astrachan, Bellflower, Spy, Sweet Bough, Maiden Blush, Porter, Gano, Nodhead, Wealthy, McIntosh Red, Russet, Roxbury Russet, Fallawater, Gravenstein, Grimes Golden, Fameuse, Pound Sweet, Fall Harvey, Wagener.

I have not the data for Cumberland county. The report is not in. Franklin county has not been completed. But I think I have given you enough to show the error in the statement that we have often heard made, that this winter killing, whatever it was, was confined to Baldwins. Now I know from personal examination, and from the reports in many cases I could point you to the total destruction of orchards. I know of one instance in which a whole orchard was wiped out entirely.

Now when you speak of the question of slope and cant, the natural position of the land, etc., I look upon a tree as very much like a human being, and the more you investigate the sooner I think you will come to the same opinion. We have orchards in the State that have been neglected for years, that this year have given a good crop—haven't had a plow—there hasn't been a hog in the orchard,—there hasn't been a limb pruned or anything done, and yet for some reason or other those men who owned the orchards have put in from 500 to 1,000 barrels of

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apples that surprised them. Now you know that some people live to be eighty, ninety years old. Put the same person when they started in at thirty or forty under different environments and with a different method of living, they wouldn't have lived till they were fifty. So with our orchards, many of them. The result of high cultivation is another thing that has gone hard with some orchards—orchards killed that have been under a high state of cultivation. And that is natural. Many claim, you know, that the Jersey cow is crowded and fed high and is weak. You feed an orchard high, you make it grow and not let the wood mature in the fall,—of course you expect to lose. There is a happy medium. I don't mean to run down cultivation at all, or any of those things, and I don't care to discuss those—I think I have overrun the time now—but there are lots of these questions that will be brought out, and if there are any of them that I can answer I shall be glad to do so later on.

NEED OF SPRAYING.

Special interest attaches to the matter of spraying in Maine. This was made the general topic for discussion at the field meetings of the society. When apples were gathered to all appearances they were generally free from scab. After they had been stored for several weeks conditions seem to have changed somewhat, and in many cases scab developed rapidly and much fruit was ruined for market. Mr. Wheeler of the Executive Committee called the Secretary's attention to this condition and he was requested to go and examine the fruit and take samples and send to Washington and Orono. The fruit sent to Washington was referred to Mr. M. B. Waite, the pathologist in charge in the department, and in reply he wrote Mr. Wheeler as follows:

Your letter to Pomological Investigations, with accompanying box of diseased Baldwin apples, has been referred to me for attention by Col. Brackett, Pomologist.

I have made an examination of these diseased apples, and find that they are affected with two troubles. The original trouble is caused by the apple scab fungus and is the disease known as apple scab. This is the small brown or nearly black scabby spot that occurs so commonly over the samples. The scab fungus attacks the apples while growing in the orchard. The disease

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begins to appear some seasons very early, even while the apples are in bud, and may come at various times during the season. The scabby spots on this fruit nearly all came after the fruit was quite well grown, perhaps larger than half size. This apple scab is thoroughly preventable by spraying with Bordeaux mixture.

We are sending you Farmers' Bulletin No. 243 on Fungicides and Their Use in Preventing Diseases of Fruits, which will give you the methods of making and applying this mixture. On page 18 * you will find a very brief discussion of the treatment for apple scab. The treatment there outlined is supposed to cover the disease when at its worst. Possibly you might be able to leave out some of the early treatments if you could count on the fungus behaving another year as it did the past season. I am not at all sure, however, that you will be safe in making that assumption.

Now these apples are also affected by a fungus rot which has come into the fruit after it was picked. The apples look as if they had been oveheated, either in the pile in a warm spell in October, or in the bins where stored, or possibly in the barrels; at any rate, a rot fungus purely secondary to the original trouble has entered the scab spots and is the principal cause at the present time of the rotten and demoralized condition of these apples. By examining the fruit again, you will see that some of the scab spots have no rot around them, and have remained straight apple scab; other scab spots have a brown rotten area

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* The formula here referred to is of a Bordeaux mixture made of the following ingredients and is known as the 5-5-50 formula:

Copper sulphate	pounds..	5
Lime	do....	5
Water to make	gallons..	50

The use of this formula is desirable where the purity of the lime is in doubt, as it makes certain, with lime of any reasonable quality, that all of the copper is properly neutralised. The danger of scorching or russeting the fruit is therefore less. Withholding 1 pound of copper sulphate also cheapens the mixture by a few cents. For these reasons the 5-5-50 formula has come to be quite generally used in orchard spraying. In fact, it has almost replaced the old standard Bordeaux mixture in spraying for the apple scab, bitter rot, pear and cherry leaf-blight, and similar diseases. In the central Mississippi valley the 4-5-50 formula has given good results, especially in dry years.

For scab, spray with either of the mixtures as follows:

First, when the cluster buds have opened and exposed the flower buds; second, just after the petals have fallen; third, a week or ten days later; and fourth, two weeks after the third spraying. In a rainy season this disease is rather difficult to control and may require five or six applications. In case of a dry spring, however, only three applications are usually repuired.

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around them, or perhaps around a group of several spots. Of course in some cases the whole side of the apple has rotted with this secondary rot. The only remedy for this secondary rot consists in better handling of the fruit. Probably these apples would have mostly gone through this trying condition—whatever it may have been—had their skin not been injured by the apple scab fungus. The common rot fungi have used the injury by scab as an entrance point and thus have gained their start in the apple. The lesson to be learned from this fruit is:

First—Your orchard requires spraying for apple scab.

Secondly—The fruit requires more careful handling, along lines which you will probably understand, after it is picked and stored.

Ordinarily best results are secured by hurrying the apples into cold storage as soon as possible after they are picked. If this occurred in bins in your cellars, it indicates that the bins were too large or too closely covered or else that the cellars need more ventilation to avoid heating.

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INSECTS, BIRDS, AND FRUITS.

By Prof. Wm. L. Powers, Gardiner.

In this day of codling moths, curculios, and trypetas success in orcharding is quite as likely to depend upon a knowledge of birds and insects, as upon skill in selecting and care in cultivating the best varieties of fruit. Ignorance of Nature's laws in the animal kingdom may and often does bring to naught the labor of him who sows, and trusts in God for the increase. He who studies those laws will soon learn that the main effort of individual life whether animal or vegetable is to reproduce its kind. So potent is this function that the natural increase of any one plant or animal, if unchecked by other plants or animals in the struggle for existence, would in a few years cover the entire land surface of the earth. In old countries which have long been inhabited by agricultural communities, the various species have had time to adjust themselves, and the balance of nature has become established.

The brown-tail moth has been known in Europe for three hundred years, and yet we do not hear of any such widespread devastation as now threatens our New England States. Its natural enemies, bird and insect, with the little that man does, are sufficient in the continental countries to hold this terrible pest in check.

The lands recently opened up to agriculture are the ones which suffer most severely. Here in the United States we are confronted by an irruption of vast hordes of injurious insects from two causes: First, our westward expansion has brought our growing crops into contact with native American insects, and these, finding their original food plants destroyed by the clearing of forests and the breaking up of the prairies, have turned to the more succulent crops of the farmer and have become terrible pests by migrating eastward and devouring the ever increasing food supply; such are the cutworms, chinch bugs, and Colorado potato beetle; secondly, injurious insects constantly being introduced from foreign lands find here a paradise in which to multiply. Having escaped their natural enemies they find abundance of food in a land where the insect eating birds and animals have been wantonly and wickedly destroyed by men.

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So vast a number of insect-destroying birds have been removed, so extensive is the modern exchange between countries, and so carefully is every corner of the world being searched for new and hardy varieties of fruits, that we may expect at any time to be overrun by new insect pests from foreign lands; for every importation of stock is likely to have upon it another insect to destroy vegetation. Indeed we have in our State today two foreign species, the gypsy and brown-tail, either one of which seems possessed of potential ability to defoliate entirely every orchard and shade tree in New England.

So widespread is the fear of insect devastation, and so universal is the belief in the interdependence of the kindred sciences, entomology, ornithology, and botany, that the Biological Survey of the Department of Agriculture at Washington is co-operating with state governments, in endeavor to maintain a balance between the vegetable and animal kingdoms.

As a result of all this study, every effort is now being made to protect, encourage and foster the native bird population of the land; scientists are studying the life histories of plants and animals; Audubon societies and nature study clubs are collecting facts of great value, while the societies of national scope are scattering broadcast the results of intensive study along particular lines; the schools have taken up the work, and the President himself is not averse to throwing a club at the man he deems a nature fakir. The utility of birds in suppressing outbreaks of injurious insects, by massing in enormous numbers at the point of attack is beginning to be understood, and the wanton destruction of the species beneficial to man is now restricted in every state.

It is my purpose to recall something of the destruction caused by a few of the insects most injurious to the fruit industry, and then show the great work done by birds in keeping these insects in check.

San Jose scale, aphids, bark lice, currant worms, grape vine moths, chinch bugs! Where shall I begin? "The annual loss in the United States from the chinch bug alone," says Dr. Howard, "cannot be less than $20,000,000," and the total value of farm products ruined yearly by injurious insects is estimated at from $800,000,000 to $1,000,000,000 without reckoning the

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vast amounts expended for insecticides and the labor of applying them.

The codling moth or apple worm, perhaps the most destructive insect in this country today, may well serve us for a beginner. This pest was early imported from Europe and is now at home wherever apples are grown in this country or Canada. It causes an annual loss of from 25 to 75% of the apple crop, as well as of many other fruits. The annual damage carefully worked out for three of our large fruit growing states is as follows: In Illinois, $2,375,000; in Nebraska, $2,000,000; in New York, $3,000,000.

Its life history is as follows. The eggs are laid singly upon the young apples, and from these eggs hatch the larvæ, which eat their way into and destroy the fruit. In three weeks the larvæ, the so called white "worms," eat their way out through the side of the apple and either crawl out on the branches or spin down to the ground. In either event they finally reach the trunk of the tree and pupate under the bark scales. About the middle of July the adult moths appear in vast numbers and a second brood of eggs is laid. Many of the larvæ from these are gathered in the fall with the apples, but enough escape in the windfalls and discarded fruit to re-infest every bark scale with another pupa. In the southern states two and even three broods are raised each season, but all pass the chrysalis stage in the crevices of the bark.

Now as these insects in the imago stage are night-flying and protectively colored, the adults for the most part escape the birds. Bats, indeed, destroy vast quantities of them, but as bats are not birds, they do not fall into the province of this paper.

I have said that the codling moth passes the third stage of its existence in the crevices of the bark upon the trunk of the tree. Now nature has fitted a whole series of birds for a tree-trunk life, and they cannot acquire their subsistence anywhere else. Such birds are the woodpeckers, nuthatches and tree creepers, while other birds like the sparrows, bluebirds, and chickadees also glean from the trunks.

The downy woodpecker, the avowed enemy of the codling moth, is with us all the year round. His whole life is given up to the destruction of insects that do injury to the trees. Whenever and wherever you see him, you will find him searching for

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food in and under the bark. In a twenty-five year study of birds I never saw one on the ground or on the tips of the branches. His whole anatomy is adapted to the life he leads; toes four, two in front and two behind, long, strong, and flexible, and each armed with a strong curved claw; legs strong, and a tail fitted to serve as a fulcrum to give added strength to his blows; tongue, the most wonderful of nature's work in its adaptability to its uses, capable of being extended almost indefinitely, its point armed with a barbed spear-like tip for probing and bringing forth from the bottom of the opening cut by his chisel bill, any larva disclosed therein.

Search your orchard for samples of his work. Examine the bark scales he has pecked into. Remove them and find the empty cocoon beneath. If you find scales with living pupæ under them, you have not woodpeckers enough to take care of your trees. Carry home with you some of these bark scales that have been treated by the downy. Next May or June collect an equal number of adult moths and kill with cyanide or chloroform. Next summer lay beside the empty cocoons and dead moths an equal number of wormy apples cut open so as to show the ravages of the insect in its larval stage; if possible, put with them an equal number of small green apples each one with a flat, oval, scale-like egg upon it, and learn a lesson of "Insects, Birds, and Fruit," that will make you and your posterity the everlasting friends of the downy woodpecker. If you are not yet convinced of the utility of the downy, solve this simple problem in arithmetic. If a codling moth lays 80 eggs, (the average number is 85) on 80 apples, and half of these eggs develop females, and each of these lays 80 eggs, how many dollars worth of apples, at fifty cents per bushel, reckoning 150 apples in a bushel, will one codling moth and her progeny destroy in one season? When you have found the answer to be five and one-half dollars, just consider how much each downy is saving for you, provided he eats only one larva per day for only one month.

Were the codling moth the only injurious insect destroyed by this bird, we should owe him a debt of gratitude for this work alone. But there are other hidden enemies tunnelling in the wood itself such as the round-headed apple borers, wood-boring ants, wood-eating beetles, the birch borer, the maple borer, and

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the pine weevil. All of these insects work serious damage to our forest growths, and if not held in check by their natural enemy, would soon become a serious proposition to owners of wild lands. Every one who raises fruit for home consumption or for market feels himself almost helpless when signs of the borers appear in his trees. Their method of work is so insidious that only the trained eye can detect evidences of their ravages before the trees are ruined. But the downy woodpecker is always on the lookout for these borers. Expert at auscultation and percussion he explores suspicious localities and quickly detects evidences of secret chambers within. Cheerful and industrious he gives utterance to his labor song, *pick, pick,* and suits his actions to his words by picking out the boring larva within.

During the summer months other tree-trunk inhabiting birds come up from the South to aid the downy in his work. Chief among these in his importance to the fruit grower is the black-and-white creeping warbler. This is a common bird in the orchards, and woodland, and may be called fairly abundant in the groves and smaller clumps of trees around New England villages. He is the particular favorite of the young naturalist being generally the first of the warbler family to be carefully studied. He is fitted for a life upon trunk and branch, but the tail is not used in climbing and his bill is too slender for cutting. He may be seen during the summer season creeping about over the tree trunks, often hanging head downward searching diligently here and there, over and back, in search of insect food. Like the woodpecker he sings at his work, and his song is the embodiment of his life's purpose, being a monotonous but not unmusical *I see, I see, I see.* And he does see every bark louse, canker worm, bark beetle, curculio, click beetle, caterpillar, resting moth, and hidden egg. He reaches for the larvæ that are spinning down from the branches, darts like a flycatcher for flying insects that have been startled from their hiding places by his approach, and when the trunk has been cleared, he often descends to the ground for cutworms. Hairy caterpillars are a favorite morsel, and he really enjoys eating the dreaded gypsy and brown-tail larvæ.

It may be well to digress for a moment to note the enormous amount of food required daily by nestling birds and the constant

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care and tedious labor imposed upon the parents to procure it. It is a fact established by observation and experiment that growing birds will consume a daily ration of meat equal to their own weight. The stomach must be kept full of food during the day to insure the fledglings' health and comfort.

A young robin that fell from the nest was brought up by hand and fed on angleworms. The man who reared him found him always hungry, and to satisfy his curiosity resolved to fill up that robin once. The bird ate that day fourteen measured feet of fat, juicy, wriggling worms, and the next day was as hungry as ever. Chas. Nash, author of "Birds of Quebec and Ontario," fed 165 cutworms weighing together five and one-half ounces to a young robin weighing only three ounces. A man weighing 150 pounds and eating at this rate would require 275 pounds of beefsteak daily.

Birds are in some respects the most highly specialized of the animal kingdom. Their temperature is higher, and their respiration more rapid than in man. The young of many birds are born naked, yet under favorable conditions they develop as rapidly as the insects on which they feed. Two different broods of song sparrows were out of the nests in eight days. In this incredible short space of time they had developed from naked, blind, and helpless nestlings to full feathered, wide awake, and active investigators of the insect conditions in their immediate neighborhoods. Before they left the nests, each bird was requiring one hundred caterpillars daily, and as the broods each numbered five, one thousand caterpillars was the daily ration eaten by the young birds, besides what the four adults consumed. Consider for a moment the work done in one month by these birds; and when the second and third broods appeared, 90,000 caterpillars were deprived of ability to injure fruit trees during every period of thirty days. I do not wonder that Mr. Knowlton in assigning my subject put the insects first, the birds next, and the fruit last.

Our common yellow warbler is another bird which comes in numbers from the South and makes its home in our orchards and village streets. Almost entirely insectiverous, it feeds on the greatest pests that attack our orchards and small fruits. Caterpillars form two-thirds of its food, and while it is not primarily adapted to a tree-trunk life exclusively, it is always

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on the alert for small bark beetles, boring beetles, and plant lice. Like the woodpecker and black-and-white creeper he sings at his work, and as he eats the young larvæ of the gypsy and brown-tail, its song *sweet-sweet-sweet-sweetity-sweet* would not seem inappropriate.

The American redstart is another trunk-loving gleaner whose fly-catching proclivities are so well developed that nothing escapes it. It delights in hairy caterpillars, moths, and beetles that would otherwise live to defoliate our orchards and destroy our fruit. It forages from ground to tree-top, holding its wings in readiness for instant attack upon every moving insect. It is one of our most beautiful and trusting birds and has a sweet and varied song. Chapman says that in Cuba where most of our warblers winter, they are known as "butterflies," but the redstart's flaming plumage has won for it the name of "candelita," the "little torch."

The black-throated green warbler is another frequenter of the trunks of trees, though most of its work is confined to the area covered by the branches. Its food consists of a variety of small insects including several injurious caterpillars, curculios, beetles, and bugs. The stomachs of five birds taken in Nebraska contained 220 insects, an average of 44 to each bird. Seventy per cent of the food of one Illinois specimen consisted of canker worms. Like the black-and-white creeper, the black-throated green is a species dear to the heart of the young naturalist, and its characteristic song is early learned. Bradford Torrey translates it as "Trees, trees, murmuring trees," but to me it seems to say, "Cheese, cheese, a little more cheese." I have never heard any wild bird sing an articulate word, and probably no two people hearing the same bird for the first time would write its song with the same words. But if suitable words can be found to interpret birds' notes, it is wonderful how it enables the listener to distinguish different species in a multitude of songs.

One of our best known bird songs is that of the white-throated sparrow, yet every author writes it differently. I was tempted to say one of our best known birds, but a long experience as a teacher of nature studies has convinced me that while nearly every one knows the song of the white-throat, very few persons really know the bird. The Indian name, says Wm. J. Long, is

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killoleet, and a more appropriate name could not be found. The song is clear and very musical. Any one who plays can easily reproduce it on the piano. Various interpretations are *Old-Sam-Peabody-Peabody-Peabody, All-day-long-whittling-whittling-whittling, My-own-dear-Canada-Canada-Canada,* and *O-hear-killoleet-killoleet-killoleet.*

And what claim does this songster have upon growers of fruits, and why should he be protected and encouraged? If a bird that devours tent caterpillars, plant lice, tussock moths, and destructive beetles found on the trunks of our apple trees, does not deserve a place in our hearts as a protector of fruits, the fact that he also on occasions descends to the earth and searches for ground beetles may throw the balance in his favor.

The chipping sparrow, the companion of childhood, is a constant worker in the garden, yard, and orchard. It is sometimes called the hair bird from the long horse hairs used for lining its nest, which is placed in a tree or vines near the house that no time may be wasted in reaching its feeding ground. Next to the robin, it is the most familiar of all our birds and often picks up crumbs near our doors. Its song is a mere string of *chip-chip-chips* with no more of music in it than there is in the monotonous click click of a sewing machine. Its spring and early summer food consists of caterpillars. So persistent is this bird in its search for caterpillars that it interfered seriously with experiments that were being made upon gypsy moths under cover, by breaking through the net that inclosed them, and eating the larvæ. Such persistence should be encouraged. The chippy is no epicure in the matter of insect diet and devours the brown-tail, tent caterpillars, tussocks, codling moth, forest tent caterpillars, leaf eating beetles, cabbage worms, beet leaf grubs, and other beetles of various kinds. Mr. Kirkland saw it eat fifty-four canker worms for one meal.

These food lists are made up from two sources: First, the birds are carefully watched near enough at hand to render identification of the various articles of their diet positive; second, when the birds are so shy that their food cannot be made out by observation, they are shot and their stomachs examined. The stomachs of thirty-four thousand birds have been sent to the Biological Survey at Washington, which maintains a department solely for this work. I was in there one day to see Dr.

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Beals, the head of this department, and he told me he had just received 134 Meadow larks for examination. These birds had been taken in Texas for the purpose of learning positively if they were eating the cotton boll weevil. I am sorry to say that I have not learned the result of his examination.

Another one of our birds that is valuable to the fruit grower is the Maryland yellow-throat. It is an easy bird to study for three reasons: First, it has a distinctive habitat; second, it has a distinctive song; and third, it has a distinctive coloration. Its throat is yellow; there is a black stripe across its forehead, eyes, and cheeks; its back is olive green. Its song is very characteristic. It is written—*whittity-whittity-whittity-whit,* and *witchery-witchery-witchery-witch.* I was lecturing on birds at the Newcastle Summer School one summer, when a woman asked: "What bird is it that says, *'Great Caesar-great Caesar-great Caesar?'* " I said, "I do not know, but if you will come out tomorrow morning with my bird class at five o'clock, I will tell you what it is, if we can find it." She lived five miles from the village, but at five o'clock the next morning she was on hand. My class had been studying the Maryland yellow throat for a week and every one in that class of forty-five had learned its song. We started on our walk, when all at once this woman exclaimed, "Oh, there's the great Cæsar bird." And there was our old friend, the Maryland yellow throat. I told this story at a teachers' meeting in Augusta the next winter. After the meeting a young lady came to me and said, "I have another story about your 'great Cæsar' bird. I went from that summer school down to the beach and the cook at the cottage where I staid said, 'Do you know anything about birds?' I said, 'Yes, I know anything.' 'Then please tell me what bird it is that every morning when I begin work, comes to the kitchen door and sings, *Gingerbread-gingerbread-gingerbread.'* " The yellow throat is a bird of the roadside and shrubbery wherever water is found. But it is a constant visitor to the orchard for caterpillars of all kinds.

The yellow billed cuckoo should be better known for it eats tent caterpillars from morning till night. Of 155 stomachs examined between May and October, only one contained fruit. In a five year study of the bird conditions in the State of Maine, covering various portions from north to south, stopping two

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weeks in a place and teaching in a summer school, I never went out one morning with a class without finding the yellow billed cuckoo. It destroys thousands upon thousands of tent caterpillars that would otherwise live to damage the fruit crop. While some of our birds devour every smooth caterpillar they find, they have no taste for the hairy varieties, but the cuckoo prefers them. It eats tent caterpillars until its alimentary tract from throat to vent is lined with caterpillar hairs. Cut one of these birds open, and it looks as though he was lined with fur.

After our summer birds have gleaned all summer long from the trunks of our trees, they leave us, and it does not seem as if anything could be left of eggs and insects under the bark to support the army of insect eating birds that comes down to spend the winter with us. The chickadee nests here in small numbers, but during the winter months it comes down from the north in abundance. Think of the amount of food that is required to support the life of these warm blooded, active, and cheery companions of our winter walks. Last winter the thermometer here in Maine ran as low as 50° below zero, yet these hardy birds bent cheerfully to their task of saving these very apples we have seen at this meeting. Even in the terrible cold they sang at their work, *chick-a-dee-dee-dee.*

The white breasted nuthatch is another bird that nests here rarely. But soon as cold weather comes on, his numbers increase and he begins his search up and down the trunks. His song is *yank-yank-yank-yank,* and he too must search diligently for insect food that escaped the sharp eyes and ready bills of our summer residents.

Another winter bird is the brown creeper. Like the woodpeckers his tail feathers are fitted for support in climbing. His bill is long and slender and curved to facilitate investigations into insect conditions under bark scales. From early morn till dewy eve—no, there is no dew when he is here—but from early morn till dark he must search for insect food. His particular sphere of action, like the woodpecker's, is the tree trunk. His body is so small that it seems impossible for him to maintain an existence in the terrible cold. Starting at the bottom of the tree —he never crawls down—he begins and circles around the trunk, hunting, hunting; as soon as he gets to the branches, down he

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goes to the botton of another tree. I have watched him half a day at a time, watched him work with that little narrow curved bill in the crevices of the bark, searching, searching, searching.

Does it seem as though there could be any insects left to develop next summer? Unfortunately there are. What is the reason? These birds were intended by nature to hold insects in check, but we have foolishly destroyed the birds.

Do you want your fruit trees better protected? Then stop the slaughter of birds about your orchards. Go home and kill your cat. She is the greatest pest that people who raise fruit have to contend with. I know of a cat owned by a man who claims that fifty birds are the average number killed by that cat every year. The cat does not stay in the house nights during the summer. She is a tree climber, and what she can't destroy during the daytime, she takes from the nest at night. Fifty birds for one cat in one family! I know another family that said their cat caught fifty-nine robins in one summer. Another man said his cat caught forty-eight—and those men were all trying to raise fruit! Those men were trying to raise fruit, yet they were keeping cats that were doing them thousands of dollars worth of damage every year. Review for a moment Mr. Nash's experiment in feeding young robins. One young bird weighing only three ounces ate 165 cutworms per day. Here were 157 robins put out of existence on three farms. The amount of insect food required per day by these 157 robins was 157 times 165, or the enormous number of 25,905 cutworms, or their equivalent in other forms of insect life. What terrible devastation these robins might have held in check had they been permitted to live.

Unfortunately for the orchard interests of Maine, many domestic cats are left by our summer visitors to resume once more their wild state. It is a pleasant thing to see puss about our summer cottages, for it adds to their home-like appearance; but when our visitors return to their city homes, the cats are often left behind with no means of subsistence unless they prey largely upon the birds. If well fed domestic tabbies will kill fifty robins, what terrible slaughter must be wrought by the hundreds of cats that return each year to a state of nature. If you hunt, shoot every cat you can find in the woods and fields. If you have a boy with the collecting craze, and his mind is set

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upon birds' eggs—no, don't kill him, but—teach him better. If there is anything that has been unfortunate for the bird life of New England, it is the collecting craze of boys. Hundreds and hundreds of eggs have been collected in every town in our State, and not one in a thousand has ever contributed to the cause of science. No data have been kept of the conditions under which the eggs were taken, and not one collector in a thousand ever published the results of all his ill directed labor. The attic and waste heap are the final resting places of the shells once pregnant with celestial melody. If your boy must collect—most boys have the passion at some period of childhood—teach him to collect life histories of injurious insects. By such work he will add to the productiveness of your farm, increase the stock of human knowledge, and animate his old age with the vivacity of youth.

Kill your cat. Stop your boys from robbing nests. Study the part that birds and insects play in fruit culture, and bountiful harvests shall follow.

FRUIT GROWING AT OAKLANDS.

By Robert H. Gardiner, Esq., Gardiner.

The very kind words of your President simply make me feel more deeply than I had felt before—although it has been troubling me a good deal—that I haven't any right whatever to appear on this platform. He has been good enough to speak of my place. I have not made the place. My grandfather and my uncle and Mr. Merrill made the place and I have entered into their labors.

If I had been able to make this address a year ago, I should have done it without very much hesitation, because I had then at my right hand a man who I think it is no disrespect to anybody here to say was as good an orchardist as there was in the State. The great beauty of my place, the great value of my orchard, has come entirely through the indefatigable labors of Mr. Stephen T. Merrill, who was called hence last winter in the prime of his health and strength, and his years were not many. Mr. Merrill was really a remarkable man,—a man of the highest

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personal character, of rare intelligence, and of as thorough and comprehensive a practical knowledge of farming and of anything connected with farming as any man that I ever met. He took my orchard when it was partly run down and he made a good orchard of it, and what I shall try this afternoon will be simply to repeat a few of the lessons that I learned from Mr. Merrill.

The gist of his success in orcharding is what must be the gist of every success in every pursuit of life—thoroughness. If he had anything to do with the orchard, he tried to do it thoroughly right down to the bottom. If we were talking, for instance, of setting out new trees, he would cultivate that field for two or three years before he set out a tree,—plow it and cultivate it and get it into thorough condition, get all the rocks out, get it smooth and the soil light and easily pervious to light and air,—get the field into thorough condition two or three years before he set out his trees.

We have always found it to our advantage to buy trees. Some fifty years ago, I think, they used to raise their trees and do their grafting. We find it very much better to buy trees. We get excellent stock and they are very cheap, and I guess it is a good deal better than it is to go to the trouble and expense of raising our own stock and trying to graft them.

I don't think too much stress can be laid upon the importance of care in planting the trees. I think the first setting out of the tree has a great deal to do with the character of that tree for the rest of its life. If there are any of the roots that are torn in the slightest degree, we cut them off smooth, and separate the roots out so that the tree will get a good chance to set. A mistake that was made in my principal orchard when that was set out some fifty or sixty years ago was in starting the crown of the tree too low. They had an idea that by letting the branches start out pretty low down it would save trouble in picking. I think that has been a very great mistake. My trees are set out thirty feet apart, and I wish they had been thirty-five or forty now they have got full grown. We find on those lower branches which are easy to pick we are lucky if we get No. 2s. They are mostly cider apples. Our new trees we are starting out the head pretty high up, so that we shall not have any branches hanging down low. It is not only that these low branches raise

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poor apples, small apples and badly colored apples, but it makes it troublesome about getting about to cultivate. And we are starting our new trees up a good deal higher, hoping that we shall get about them more easily to cultivate, and that we shall get more No. 1s and less No. 2s and No. 3s. There isn't any money, I believe, in raising anything except No. 1 apples. I don't believe it pays to raise cider apples or No. 2 apples.

And then when we get our orchards started, we prune the trees. As I look round, Mr. President, and see you and these other gentlemen here who have been orcharding before I was born, I feel a little bit like the young lawyer who argued his first case in court. He began telling the court a lot of things that are taught to a boy in the law school the first half hour of his first day there, and he noticed the court getting a little bit restive and he stopped his argument and said "Excuse me, your Honor, for dwelling so long on these very elementary points but it really would be such a great pity to have this case decided wrong." So I feel that I am dwelling on elementary points; but you have asked a man whose knowledge is limited and you have got to endure him if he dwells too long on these elementary points.

Then we believe very greatly in pruning—pruning to shape the tree, to get as much outside to the tree as possible, and pruning also to promote the fruitage of the tree. We try and make the tree all outside. We take out the inside of the tree so as to give just as much exposure of the tree to the light and sun as possible. It is the sun largely that makes the No. 1 apples. If an apple does not have good air and good sunlight it does not turn out a good color, and what we want to do is to get just as much outside to the tree as possible, and have just as little of the fruit inside where it doesn't get the light and air. Then, so far as my experience goes, I think pruning is a great incentive to fruitage.

We had rather an interesting example of that a number of years ago. There were two or three rows of trees which had been set out a number of years; they were badly handled after they were set out; within a year or two of the time they were set out, before they had time to establish themselves they were very heavily budded and it gave them a set-back which it took them years to get over. They never had borne very heavily. They were fairly good sized trees for their age—rather small for their

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age, but they never had borne very heavily until a number of years ago. It was about Thanksgiving time, the leaves had stayed on the trees unusually late that year, and there came a very wet, heavy, clinging snow which stuck on these leaves and bent the trees, squashed them almost down to the ground. Well, we got out the next morning and beat off the snow as well as we could, but in spite of all our efforts those trees were very seriously damaged. There were a great many big branches torn out, and the trees were torn pretty badly. The next year those trees that had been badly torn were loaded with apples, and almost every apple on those trees, a very large percentage of the apples on those trees that had been most heavily damaged were No. 1 apples; we found very few No. 2 or cider apples on the trees that had been most heavily damaged. The other trees right alongside of them where we had been more successful in knocking the snow off had a smaller number of apples on them, and the apples they did raise were not very good ones. So that we have always found it to our advantage to prune pretty heavily. I think it promotes the growth of the tree. The tree seems to have what one might almost call an instinct, when it is damaged, to try to propagate itself by fruiting heavily to make up for its expected dissolution. It is almost as if the tree said "Here has something happened to me that is going to kill me pretty soon and it is my business to preserve my species, and I will raise all the apples I can next year, and the best apples I can, in order to keep up the growth of apples." I have been told —I have never tried the experiment—that if you damage a tree, drive some nails into a tree, hurt the tree, that the tree will in the same way give extra fruit the next year.

Then we cultivate pretty heavily. I think the plow is a pretty valuable part of an orchard, the plow and the harrow. We thought it was a great scheme to have sheep and we tried sheep one year in the orchard to eat up the wormy apples. It so happened that year that we had an unusually good crop in that sheep orchard, but I don't think it was altogether due to the sheep, and I don't think the sheep have seriously diminished the number of worms in that orchard. I think that enough worms or moths have come in from the other orchards to prevent that from being of any very great value. We are going to plow up that orchard now. We think the sod has got too hard, too solid,

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and we have taken out the sheep and are going to plow up that orchard. I believe the plow and harrow are very valuable helps to the orchard. I think the ground ought to be kept loose and light so that the air can get down to the roots and so that the water can get down, and above all keep the top of the ground stirred constantly by the harrow so that the water down in the lower tiers of the soil won't all evaporate. I think once or twice we have saved our crop in dry summers when there was likely to be a drought—I think we have saved our crop by harrowing the surface, breaking up the top of the ground so as to prevent the evaporation through the ground.

Now I don't know that it was intended that I should speak about packing apples, but I think perhaps the most essential thing about growing apples is the way in which they are picked and packed. And I think one reason why these Pacific Coast apples sell for such high prices—those from California and Oregon and Colorado, for instance, that we hear so much about—is that they pay more attention to picking and packing than we do. When apples are picked and wrapped up in paper and packed away in a box, a man is apt to be more careful than when he is packing his apples away in a barrel. I rather think that taking the thing by and large, with a great many notable exceptions—I rather think that the Western apples are better packed than are our Eastern apples. I think more men out West take trouble in packing their apples than there are in the East. I don't say there are not a great many men here in the East who pack apples just as well as anybody in the whole country, but I think we are afflicted with more men here in the East who don't pack their apples well. Now if I send a barrel of apples up to the market that is badly packed, that is a great injury to you. Because there are very few purchasers of apples who know anything about it, almost everybody in the big cities. for instance, thinks one barrel of apples is exactly like another. They have been accustomed to buy their coal—they can't tell the difference between one lump of coal and another, one ton of coal and another, and they think it is the same way with apples. If I send to market a barrel of apples that is badly packed, bruised or poor fruit in the inside, and handled roughly, why the person that buys that barrel of apples is not going to content himself with saying "I will never get any apples from that man

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Gardiner again," but he is very likely to say "I don't want any more of these Maine apples. I will buy my apples next time from Oregon, or California, or Colorado." We try and handle our apples—this is a common-place, you see it in almost every issue of every intelligent agricultural paper, but I don't think it can be said too often—we try and handle our apples exactly as if they were eggs. And it is not only for the sake of this year's crop, but of next year's crop. When a man takes an apple between his thumb and finger and presses it hard, he is pretty apt to make a bruise; and if he yanks it off, he probably yanks off next year's branch. It ought to be lifted properly where it will come off at the hinge which the Lord has provided for that apple. At the right place, if the apple is taken in the hand so there is no pressure of the fingers, and lifted, it will come off in the proper place and it will leave next year's bud in the place where it ought to be. I think most careful orchardists have pretty nearly eliminated the off year on apples, and I think it is very largely due to care in picking. I won't say mostly, but I think it very often happens that the reason why there is an off year in apples is because so many of the next year's buds have been pulled off in picking this year's apples.

Now the matter of bruises. We had a good lesson, I think, a number of years ago. We cultivated our trees with manure, thoroughly rotted manure with some soil mixed in it. It was almost as soft as a feather bed, just as soft as anything could be. We had a number of apples blown off in a gale and they fell down on this perfectly soft bed, just as if they had fallen on a feather bed, and we picked them up and we couldn't see that they had been damaged at all, and we wanted to sell them to the gentleman in Boston who was then buying my apples. I told him about it. We put them up in separate barrels and marked them. "Well," he said, "you can send them up if you want to, but they are not worth sending." "Well," I said, "we can't see any trouble with them." "Well," he said, "you send them up and I will keep them for you." We sent them up. He kept them, I don't know how long, some weeks, but sure enough at the end of those weeks, those apples on which we could not see any bruises whatever when we first packed them, in the course of weeks those apples developed bruises all over them. Finger mark bruises will develop in just the same way. A man can

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very easily take an apple and pinch it in such a way he won't see any bruise at the time, but if it is a delicate apple that bruise will show up not very long afterwards. What we try to do is to pick the apple in the hand without squeezing it, and then place it in a basket. We don't drop it in the basket but we place it down in the bottom of the basket. When we come to sort we do it in the same way, take them up by hand from the basket and put them by hand down in the bottom of the barrel, place them. And don't allow one apple to drop on another. It takes a little bit more time and it takes a good deal more trouble, but it produces a satisfactory article, and produces an apple that will keep. Even the most delicate apple, if it is handled properly in that way, will keep in a way that a much harder variety won't keep if it is treated as if it were a lump of coal and dropped into a basket, and then rolled out of the basket into a pile.

Then my experience has been that in selling apples, it is a good plan to look up the character and the intelligence of my buyer pretty well. I not only look up his financial standing—I look that up to see if he ranks well in Bradstreet's—but what I want to find out most about the man is whether he knows the difference between a good apple and a bad apple. And when I go to a new buyer I always get him to take me into his storage houses and see if he knows the difference between a No. 1 and a cider apple. I don't believe in selling apples to those fellows who don't know the difference between a well packed barrel and a poorly packed barrel. I think a man who understands good fruit and good picking and good packing is a much more satisfactory man to deal with, if you have got a good article. If you have got a good article, then he knows enough to know it is a good thing, and he will treat you better, give you better prices for that fruit than a man that doesn't know anything about it. So I like to see my buyer out in the storage house, like to look over his fruit; and I like him to be a little careful and see whether I know the difference. I like to have him put me through an examination and see what I know about apples, see if I know the difference.

Then one other thing that I want to speak about is manuring. I don't think we can put too much dressing on our orchards. If we are going to get good apples we have got to put an everlast-

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ing amount of dressing on them. It sometimes happens, I know, that an orchard that has been neglected for many years will suddenly turn about and produce a crop of very handsome apples. But that is an exception; it is not the rule. If we are going to expect to get good crops year after year for a long series of years, we have got to feed the trees, and we have got to keep the ground thoroughly and heavily dressed. I don't think we can put on too much dressing.

Now I am going to be just a little bit presumptuous, and although I have admitted what is perfectly true that I don't know very much about the subject, I am going to give my own experience in contradiction to something that was said this morning about the destruction of trees this last winter. In our experience the trees that were lost were Baldwins. I think every single Baldwin tree on the place was taken out. Most of the Baldwins we had were in an orchard by themselves, but there were a few trees scattered here and there through the other orchards. So far as I know, last winter went over my orchards and if it found a Baldwin tree over in that corner it killed it, if it found another one over here in this corner it killed it, and if it found one in another place it killed that. But as a rule it did not touch my Bellflowers, which have been the trees that we have cultivated most intensely and which we have pressed the hardest. My Bellflowers for a good many years have been pressed as hard as we knew how to press them. We have cultivated, pruned heavily, manured, forced them as hard as we knew how. My Bellflowers were not damaged as a rule. The principal damage to my Bellflowers was to the trees I was speaking of a few minutes ago, the trees which were mishandled when they were first set out—it must have been thirty-five years ago now—those trees were mishandled when they were first set out and never were healthy and vigorous trees, and a good many of them were killed this last year. My experience has been that last winter was disastrous to the worst trees. My Baldwins were almost all old trees that had been hurt some years ago when there was a general injury to Baldwin trees, and they had never really recovered. We hadn't forced them as we had the Bellflowers. The Bellflowers we had, as I say, forced the best we knew how, and as a whole there was very little damage among the Bellflowers. It destroyed my crop. I got almost the

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smallest crop this year that I have ever had in quantity, and I guess on the whole the worst crop in quality that I have ever had. But it didn't kill the trees that had been most forced. It may be we shall find that a good many of them are dead next year, that they have just struggled through this year without showing any great sign of injury, and we shall find a good many of them won't live out next year. But our experience has been that it pays to force the tree,—to start them right and then after they get started to force them every way we know how, by cultivating, and by manuring, and by pruning,—make the tree grow just as fast as we can make it, and give the tree if possible a short life and a merry one, and when its short life is over, dig it up and start another one in the same way.

HOME STORAGE FOR FRUITS.

By T. L. KINNEY, South Hero, Vermont.

I think the apple is the main fruit grown for market in Northern New England, and it is the market subject, very largely, that we are discussing as I see by the program today. The most important subject of any that we can consider at the present time in New England, in Northern New England especially, and in fact all over our country, is the legalizing of a standard for grading, for packing and marketing our fruit. It seems to me to be of the first importance.

The next perhaps most important question is the labor subject which is staring not only the fruit growers of our country in the face but everybody that is trying to do business, the manufacturers, the farmers, the agriculturists in any line.

The next subject which calls our attention more strongly I think than any other is home storage, especially here in Northern New England, Northern Vermont, and Northern New Hampshire, and the whole I think of Maine. The dairymen of the State of Maine and the state of Vermont have long since learned the importance of having a place for their cows, a dairy barn—and it can't be too good, it must be up-to-date—the cows must be cared for and the products cared for; the horseman never stops with the pasture in breeding a horse for market, but he

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procures a barn and all the equipage to train that colt and bring that colt to the position where he will bring the best price, he has his barn and all the equipage and feeds him for whatever the colt is designed to be, that he may get for it the best price. Now on the apple question, the apple business, I have noticed in our part of New England that the farmer works for and wants to get an up-to-date orchard, fine apple orchard; he works the trees and the soil and he studies all the requirements of that orchard. The trees come into bearing in fine condition perhaps and the crop is grown and he works all the season to get a good growth to his apples and a good color to his apples, and to get them in the finest condition, and then what? Sell them. Sell them, is all he thinks of, is all the commercial interests of the country think of. Let the farmer sell them no matter whether those apples are grown by him for next February market or for today. Sell them! That is what the commercial interests of the country demand and it is what they want. They want the farmer to produce the apple and let the commission man or the fruit man, the commercial man, have the profits. We of New England have got tired of this. We want the profits ourselves. Let the commercial man have his profits after we have put those apples on the market at a time when they need them, when the market demands them. For instance the Snow apple is demanded on the market in October and November, through the holidays, sometimes lasts even till Christmas; then the King and Spitzenburg, those apples are displayed on the market during the holidays, and the Rhode Island Greening and that class of apples; in January and February the market demands the Spies and later on the Baldwin and the Russets. Now what farmer wants to put the Snow on the market in February and March? There is no demand for them. They may be well preserved in good storage but nobody wants them. The market isn't calling for them. It is no time to put them onto the market. Some dealers do hold a few for special customers, but no dealer ever was known to hold a whole storage of Snows for the February market. They don't demand them. They don't want them. Then why should we New England farmers place our Northern Spies and our Baldwins, such beautiful apples, such long keeping apples—such grand apples as you have on these tables here today,—put them on the market

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now? Yes, six weeks before now. How many of the orchardists over in Vermont, and I presume in this State, made their sales weeks ago! The buyers knew there was a rush in the market, they knew there would be a call, and the quicker they bought them the surer they were to get them. And we are obliged to sell because we are not prepared with home storage. We may use cold storage, the commercial storage, if it is at our hand—it can be done, it is not positively necessary for a New England farmer to build his own storage. Because when we learn that we can ship our fruit to a cold storage in the city markets and hold it there just as well as the commercial dealers can, why then that will do. But very largely New England farmers don't like to do that. There are many reasons why we should not do it. The commercial storage is expensive. They hold their temperature by ice and by chemical conditions, but up here in Maine and Vermont we have a temperature that is just as well adapted for the holding of winter apples as it was during the summer to grow this beautiful fruit. There is no temperature in the world that can grow a better apple than the temperature of New England, the northern part of it. It is just adapted to the production of fine apples that have the keeping qualities. And so it is with the holding of this fruit until the time when it shall become matured.

Now then, how shall we manage to have a fruit house,—a home storage? I don't think it is important that we build an elaborate house, an expensive house, though we may if we choose. But whatever the conditions are that surround the farmer who wants a fruit house, a storage house, let him build according to that; but let him be just as particular in preparing that fruit house so that when a cold wave comes he is not fearful of the frost getting through it, as he was in preparing the soil for the trees and caring for them when they came to bearing. A fruit house needs simply to be air-tight. You have the cold air up here in New England to force into that building by large windows on sides where the circulation is most liable to go through. We can cool off a building to a considerable degree of coldness before apple picking time comes. We commence about the first of October to pick our winter fruit. Before that there are several cold waves that come with us from the west and northwest, and our west windows are opened and those cold

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waves come and the wind sweeps through for one or two or three nights. Then if the building is closed up and it is air-tight, that only stays there until the next cold wave comes, perhaps a week later; then it is opened again and re-shut, and by the time we are ready to put our fruit in there, that building is cooled through and through, and if it is a large building it won't matter even if the doors are opened during a moderately warm spell. By cooling up our house in this way we have it sufficiently cool to put our winter-keeping apples in and hold them until spring. Then when the cold days of winter come, if our building is air-tight so that the cold can't get in, there is no danger of freezing, and when the warm days come if it is so tight that the warmth can't get in, the apples will remain all right. You know we don't manufacture anything in the holding of apples by cold storage, but we are holding what has already been built, we are holding the apple till the proper time comes for the market to consume it.

Now there are many considerations in holding this fruit that we want to think of and study as we go along. Some will say: How will you put these apples into the cold storage building? Well, the Rhode Island Greening and that class of apples that are inclined to scald, should always be put in as near to a condition like this as may be. Crates, perhaps bushel crates, with board ends, with lath on the three sides, making a genuine little crate—it is a storage crate—and these crates filled with Greenings and placed one above another take but very little room. There isn't the room consumed that there is with barrels, and the air comes in contact with every apple all the time while it is in storage. Some of you may say, Well, our building is air-tight, what matter whether it is in a barrel or a crate? But with the Rhode Island Greening it does matter; and those apples should not be where there will be any inclination to heating in the middle of the barrel—not a genuine heat but just a little heating which causes them to scald. The scald is all we fear in storing the Greenings. The Northern Spy, the Baldwin, the Ben Davis and that class of apples can be just as well held in great bins that will hold a few hundred barrels, if you will, as any other way.

This fall we commenced our harvesting of the apple crop and we were short of barrels, but we didn't care very much and

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when we came to the Spies, instead of using barrels which we didn't have at our command, we built bins across the building, in the lower part of the building. These bins held—three of them—held eight hundred barrels and they were tiered right up the same as if bins were built across this room, one bin and then another. We had to make them not too wide because we couldn't get the apples in without jamming. Then, as the gentleman has told about, we had to be very careful in emptying in these apples—rolling down and filling the front of the bin first.

Now it seemed to me at one time when I first thought of storing this fruit, in fact we used to store in bins with partitions eighteen inches or two feet high, and then another bottom placed in the bin and then another, and so on. But it doesn't amount to anything; I don't care if it is ten feet high. You know you can fill a barrel of eggs and the egg in the lower part of the barrel is no more liable to break than on the top; the pressure of one against the other holds it. If there is no moving or giving of these sides to the bin so that there is a shaking back and forth, those apples on the bottom of the bin never will jam. Then hang a light right over the top of the bin and it makes the nicest place to grade and sort apples. In the fall all we had to do was to hustle and bustle to get help to pick the apples and get them in those bins. Now we are at leisure to come to Maine or anywhere else and let our apples rest there till the market demands them. This is a great convenience to any farmer. Some farmers may have a location especially adapted, where they can dig into the side of a bank, and in a position where they can get a circulation of cold air; otherwise you can use ice.

The matter of selling in the winter, shipping in the dead of winter comes in with the cold storage question. We think if we had a thousand or two thousand barrels of apples out here in the storehouse, we are fearful we would not be able to get them marketed without freezing, or that they would be frozen on the way or after they got there, or while we were getting them there. But we have learned that there is no more trouble in shipping apples in the dead of winter than there is in shipping butter or anything else of that nature. The apples are sorted and packed in this fruit house in the temperature which they are held there, and then they are hauled down to the station in a

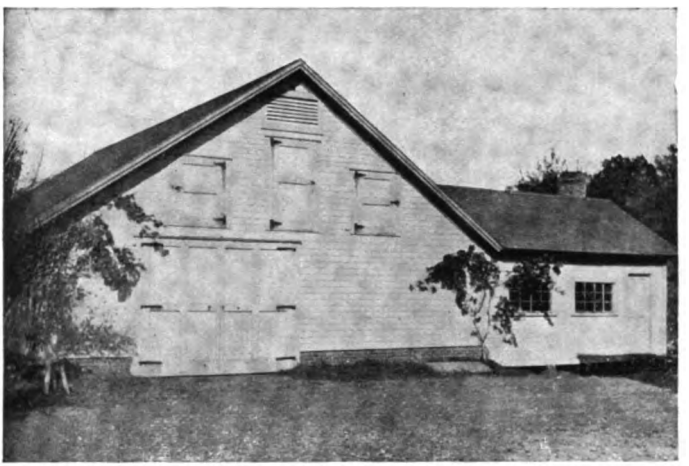
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sleigh perhaps, throw a canvas over your barrels so the wind won't strike the barrels very hard, and take them down to the car, load them into a refrigerator car, roll them right in, pack them up in there the same as you do in the fall or summer and tighten up your doors tight, and they won't freeze in going from here to Boston—they won't freeze in going from here to the Pacific coast, I don't believe. We never have had any trouble to amount to anything from freezing in transportation. We warm up the car with an oil stove before we put the fruit in most always, so that the inside of the car is comfortably warm, and we most always pack in with straw—and if you have the very best refrigerator cars this is not necessary; and this way we have with us, we have a car that goes to Boston and returns in our own service, in our own name, and when we have a good many apples as we have had this year to ship, we will have two or three cars a week. That keeps us constantly busy throughout the winter; saves us from getting into trouble; gives our hired help who don't need money very much but still do like to have it, plenty of work to do through the winter; and puts our apples on to the market at a date when the market demands them, when they want them.

I don't think that this is the most beneficial year for home storage that we ever have had in the way of getting high prices. It seems to me that the limit is pretty nearly reached in the prices that they are paying for apples this year. Yet it may be that we can double these prices this winter. Very often we double the prices from fall to winter.

Now I want to consider just a moment the commercial method of buying apples and handling them and putting them onto the market. A man from New York or Boston, or a firm—a millionaire firm generally, sends out agents all over the country, to the west and to the south and in New England, and they send even into Canada to look up apples and find where the locations are. And those agents appoint other agents, and those other agents hire men to pick their apples and pack them and grade them and ship them. They hire the same cars that we are hiring to ship them to some distant point to cold storage; they hold them until they wish to sell them. Now can those men manipulate that amount of management cheaper than the farmers of Maine? Can they pick those apples cheaper than you can?

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Storage house of John W. Clark, North Hadley, Mass. (front view)



MAINE FARMER PRESS, AUGUSTA

Storage house of John W. Clark (rear view)

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Can they grade them better than you can? Can they hold them better than you can? Now when the time comes for shipping, what do they do? When they want to take out a hundred barrels of Spies out of that cold storage, they go into the cold storage, and if they shake a little, they take one barrel, plug it a little, squeeze it down and it goes onto the train. Now a farmer up in Maine, with the kind of apples that the gentleman has spoken of, if he is dealing entirely with his own apples; he has them in his storehouse; he repacks them—or doesn't repack them, they never have been packed—he grades and packs them in February perhaps, or March, and the next week after they are packed they are being consumed in Boston or New York or some other market. There are no rotten apples down there squeezed in together to make the barrel appear tight. They are just what the market wants. And how long before—if this package is properly marked—how long before he has a reputation upon his apples in the market, whatever mark he uses?

Now take the conditions of the trade today, this year, when they want all the barrels of apples they can get, and what do they do? Are they particular, the buyers, to hold up the standard of Maine apples? I hope it is not in Maine as it is in Vermont, but I can illustrate by the actual facts in my own neighborhood. One of my neighbors sold his orchard for $600—it was a small orchard—just as it was; didn't have to touch them excepting to haul the barrels from the station and to haul the apples to the station—didn't make no difference whether No. 1s or No. 2s. Every barrel they had were No. 1s—almost all the barrels in that lot—they put in everything there was in the orchard,—windfalls, wormy apples, drops and everything. But they were faced with good apples, faced on both ends with good apples. Has it helped the reputation of that county to have such apples as that go to market? Customers know they came from the Champlain Valley, because they bring a bigger price because of the reputation of the Champlain Valley apples. Another man sold his orchard for $500 in the same way. Another sold his apples for $3 a barrel, and they did all the work and even hired the man that owned the apples to oversee the crew; and they put in everything into those barrels that

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they could scrape because they wanted the number of barrels and weren't particular for quality.

Now here is the immediate point for the farmers of Maine. Protect your interests. Protect your market. Protect the quality of your fruit. Don't let that fruit displayed on these tables go to face a mess of slush for some speculator to get rich.

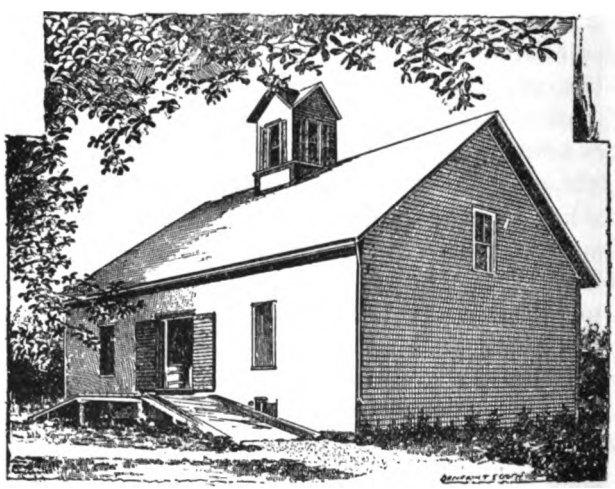
This neighbor I spoke of who sold his orchard for $500, said, "Yes, I made a pretty good sale, but not very good after all. Think how long I have been cultivating these trees." He has had crop after crop almost as good as that one. I said how many trees did you get these apples from? Small orchard, only part of it bearing. He said sixty trees. Less than an acre and a half of apple orchard and he got his $500 without lifting a finger. Look at the profit. But then look again and see what he is doing. He is killing the reputation of that farm and of his neighbors by sending that stuff into market as Champlain Valley apples. You farmers in Maine, it is just as important that you with this reputation you have got for your beautiful long-keeping apples, should handle that product yourselves. How can you do it? Here is the commission house. The gentleman has just told us of going to the commission house. Now those commission men all know what a good apple is. They can almost look through a barrel without taking of the cover. But tell them what you have got at home, let them know you have got an orchard up in Maine, and not you alone but fifty or twenty-five of your townsmen, and that when they want Snows you will send cars of Snows—if you can't yourself, you and your neighbors clubbing together. Co-operation is something that is hard to deal with in Maine and all New England among the farmers. It is not hard to handle in the great West but it is hard with us. I won't put my apples into a car if you are going to put yours into it, and another won't put his into a car that Kinney has anything to do with. But we have got to combine. You don't know what I get for my apples. My account is with the commission house, and he never divulges what I get or what you get. That is the way we do there. One man don't fill a car alone very often. One of us will see to the shipping. There are a dozen to fifteen home storages in our own little island, running from 2,000 down to 200 barrels in the storehouse, little houses made on purpose for storing apples, nothing else. When I get a

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car ready to load, which this one or that one or the other one knows by our telephone service and in other ways that such a car or such a series of cars is going to commence shipping that day or that week, and they call up to know if they can put in ten barrels, another one twenty, another forty, and we make up a car load and in just two or three hours the car is all loaded and closed up. It gets to market; every man's apples are marked and every barrel is supposed to be marked Vermont apples—we are trying to advertise Vermont apples, not Maine or New Hampshire—and it seems to me every barrel ought to be marked that way, whether they are No. 1s or No. 2s. Each one gets his returns back and there is no trouble in this co-operation. Then think of the commission house. They want to know where these apples come from, and they want to know, if they get apples that will satisfy them this year that they will have the privilege of getting them next year. A man in Massachusetts has been sending to Hall & Cole for years; they just as much expect those apples—they are acquainted with the man—and they know just what they are doing, and he knows that they won't go back on him, because they think just as much of this side of the trade as they do of the other; they think just as much of the producer, provided he is honest and intelligent, as they do of the consumer. My case is perhaps a little different from most of you people. I have a son in the commission business, and you know if he cheats me why it is all in the family so it doesn't matter so much. But before he commenced business I had a great deal of experience with other commission houses, and I took great pains to get them to our island and to take them about our island, show them the different orchards, make them know we were in earnest in this subject of apple production and apple selling; and it was the greatest trouble for me when my son went into the commission business and I had to leave the other commission house and turn the goods over to my son, because family ties were stronger than this experience which was very satisfactory in commercial ways. He died, and now I have a son in Boston, and my goods are all going there. But you will have no trouble in selecting a commission house, providing you can satisfy their wants; it is just as simple as any other production.

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Now about the building of the storehouse. How tight has it got to be? To build a fruit house, if you are going to build it of lumber, use studding as wide as you want your air-space, and it don't matter much whether two inches, one inch, or five or six. And the way mine is built is studding up and down, tight boarding outside, matched lumber, lathed and plastered inside—lath and plaster in the middle and leave an air space on the inside, and then seal up on the inside with tight boarding leaves another air space, a little paper and then sheathing completes that wall air-tight; and then paper and clapboards on the outside makes it double air-tight and there is no circulation of air; double windows and have shutters outside.



Storage House of T. L. Kinney, South Hero, Vt.

Now about the moisture, in keeping fruit in that fruit-house, it will get wonderfully moist in there. I have seen the ceiling in the upper room in that fruit house all covered, quite thick, perhaps an eighth of an inch of ice, just occasioned from the steam coming from the apples. It goes up there and freezes and gathers.

Now I don't think it is necessary to keep that atmosphere dry. I think it is better to have it moist. I think it is better to hold that moisture in. But that is a matter of ventilation which might aggravate a good deal of discussion on the ventilation of an apple storehouse. If a body of apples are wet, or very wet, I don't think it makes any difference in the keeping quality of

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those apples. They don't want to be hit together wet and then become dry, they don't want to become cold and then warm. If those apples get so cold they freeze, it don't matter very much if they don't thaw out too quickly. An apple gets to be cold, very cold, freezes, and then if it goes back very gradually to very cold and to cold and don't go any further than simply cold, you never know that the apple has been frozen. So don't be afraid if your apples get touched on the outside around the walls with frost; it won't hurt them any if you don't handle them while they are frozen.

Now the next matter which comes up for a storehouse at home perhaps would be the convenience to the farmer at picking time, although this labor question is a hard one when a man has a thousand or two thousand barrels of apples to pick and no one to help him do it. And then when you get together, as I did this fall and have several falls, a lot of young men, it happened this year that the first lot of men I hired didn't one of them put in an appearance, and then when I hired another set, hired them from factories where they had been shut down a few days, those boys didn't have any more interest in the picking of those apples than they did in anything else. The question with me was, how can I get those apples secured the quickest. You know there was a terrible frost that scared us all to death pretty near—didn't seem to hurt the apples right in our locality, but it did in some parts of Vermont. How can we handle them the quickest, the safest and the best?—The best way I have found is to have a place where you can haul those apples from the tree right into their storage place. I haven't sorted or graded an apple that came from the trees—put the good, bad, all conditions, right into the bin and in the barrels. I don't like that way. I would rather partially sort those apples before they go in, but this year I couldn't do it, circumstances were such. This storehouse gives me an opportunity to handle my crop when I couldn't handle it otherwise. One man came to me who had fourteen hundred barrels of apples; he had them all graded, sorted and sold. He said: "If I had had a storehouse I could have waited two weeks longer before I picked an apple—if I had had a place to put them and then handle them later on—and I would have got more difference than the storehouse would have cost me in the value of those apples, because that is just the time that red

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fruit was maturing and putting on its best color." Here in New England you want to leave your apples just as late as you can and have time enough to handle them. Now then if we have a storehouse that will help us along that line, it is worth considerable. One man who built a storehouse several years ago, Mr. Tracy, a neighbor of mine—the upper part of the building was built by a railroad construction company and they gave it to him when they got through and he built a cellar right under it—carried 800 barrels, and the first year he put his apples in there without grading or sorting, and the buyers went to buy them; no, he didn't want to sell but just as they were getting ready to go away, had closed up their deals, they offered him more than enough to have paid for the building of that storehouse, with that one crop—more than they would have paid him when they were buying apples. You see the importance of these things.

Now there is another matter which I want to call your attention to in having a storehouse. You know you think more of a good horse if you have a nice barn for him. You think more of a dairy cow, or a lot of them, or a herd, if you have nice stables, up-to-date, all sanitary, clean and nice. And so you feel about your apple orchards. Now you want to have all the interest in an apple orchard that you have in any other kind of operations that you have on your farm. If you are not interested in it, you won't be very successful; you better sell the first opportunity you get.

F. H. Morse. I have had a little experience in cold storage, and my experience corroborates every word Mr. Kinney has said in regard to the success of it. Mine is simply a dead-air space building, very cheaply constructed. We hired a carpenter for just a few days to put up the building and get the outside finish on. The inside of it we did wholly ourselves. We found that we could do it better; that is, that while we were not so used to carpentering, we were more sure of getting what we wanted doing it ourselves than we were to hire it. The building of it is simply a matter of thoroughness. The air spaces have got to be air-tight and that is all there is to it. And then this matter of convenience that Mr. Kinney has spoken of is a very great factor. As he said he did this year we have done for ten years; we have taken our apples right from the trees. Where we have to hire our work done, as I do, to depend on hired help, it is no

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use to tell them to sort them as they pick them. And then very often it has been, as it was this year, nip and tuck to see which would get there first, the frost or we. And in that case you have got to do as you can and not according to theory. We have turned the old fashioned theories of picking apples upside down. When I began to raise apples twenty years ago, they said to always pick them when they were dry; don't put any leaves with them; never touch them when they are frozen. Well, we began by doing as they stated. That will do if you have got time enough. But we found that where we put them in this house a few leaves didn't do any harm. So I told the men to be careful not to pull off the stems but leave the leaves right on and put them in. Then we found we couldn't wait for them to get dry and we picked them in the wet, any time it was suitable for a man to work, whether the apples were wet or not. We picked them that way—took a little pains to set them where there would be a little draft afterwards, or in bins where a little air would draw through and dry them off; otherwise that is all we have done. When we packed them we didn't find any difference; they were just as good as when picked dry. This year we found it was a question of picking them when they were frozen or not getting them at all, and we picked them frozen. Monday morning we picked them with gloves on and put them in the barrels frozen. This was an experiment, we thought we would try both ways. We took a horse blanket which happened to be the only thing convenient, turned six or eight barrels on to that, Monday morning. They laid there until Friday noon and then we took them up and the frost wasn't all out in the middle of the pile then—so you see they were frozen pretty bad —apples all right—once in a while a little mark but nothing that harmed the apples at all. So I have no fears of picking apples when they are frozen. We put them into this storehouse, as I say, dry, frozen or any other way to get them there; and we pack them any time. Sometimes we hold them up to February or March and they have always come out in first-class condition. When the room is once cooled off there is no trouble in keeping it for weeks or even months. It is my opinion, although I have never had any experience with the cold storage in cities, that we can keep our own apples by putting them in there right from the

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trees and have less waste than to ship them and have them stored in high-priced cold storage houses.

V. P. DeCoster. Have you had any experience with the apples sweating in cold storage?

Mr. Morse. No, we haven't. After they are once in there and dry they don't sweat, because the sweat, as I understand it, is being cold and then warm; the changing of the temperature is what makes them gather moisture. If the temperature is even I guess the apples will never sweat. I don't know as I am right, but that is my idea. I never have had any trouble in that way.

Question. I would like to ask the gentleman if he has any trouble with rats?

Mr. Morse. No, sir, never have seen a rat in the house; once in a while a few mice but never any rats. This storehouse is a mile and a half from my home. We can't care for it to as good advantage as if it were right at home where we could open it every cool night and shut it up every morning. But of course we get up there once in a while and leave it open through the night and shut it in the morning, but we have done it very few times.

Question. When you built it, you didn't put anything in to make it rat proof?

Mr. Morse. When you get it air-tight, it is pretty near rat proof; eight thicknesses of board and four thicknesses of paper clear round it, a rat has got to have pretty good courage if he gets in.

Question. Sill at the bottom?

Mr. Morse. Yes, sir.

C. S. Phinney. It seems to me it would be of advantage if we could know something about the cost of the storehouse.

Mr. Morse. I can't give you much of an idea as to that. The cost would be entirely different with different people according as they are situated. Of course if you were to build one now, and use lumber at a high price as it is, and hire a carpenter to do all the work, and put in eight thicknesses of board and four of paper, it would be very expensive. But I think it could be built with matched board, one thickness perhaps, just as well, or perhaps something else could be used. We built ours of cheap lumber except matched boards outside

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and in; all the other is very cheap; and as we did it with our own help and at odd times, I can't tell you. Any one else could figure it up just as well what the cost would be, and a little better than I could. But since then—we are building now—we have got part of it now—a larger storage room in our barn. We had some room that we could spare without interfering seriously with our hay room. We had a silo in one part of the barn—and we took a space about forty feet from the silo to the end of the barn. We took and dug down to get six feet below the barn floor; laid up with stone and cement, and have a bulkhead in the end of it that opens outside. We have quite a room, high enough to set five barrels high, one above the other. In that way we are getting a place where we can store ten to twelve hundred barrels. When I built this first house it was built to hold 600 barrels in 1895. I didn't have an idea I should need anything else to hold my apples. But in just a few years we had outgrown that and this year we picked over 1,200; so at this rate we shall have to be looking out for another one pretty soon.

President Gilbert. Will Mr. Kinney give information in regard to cost and also inform us in regard to the holding of the temperature and securing it?

Mr. Kinney. The cost of the building of course cannot be determined until one knows what the conditions are that the person is building under. The building which we built in 1888 cost $1,500, slate roof, with 5 ft. wall, 2½ at the bottom; the cost of course would be $2,500 or more today. But any one can estimate the cost the same as they would estimate the cost of any other building to make it air-tight.

About the sweating of apples, apples will always sweat when they are moved from one condition of temperature to another, whether it is colder or warmer, but that doesn't affect the apples unless they are constantly changed.

Now just a word in regard to holding the temperature in such a room as this. If this room was filled with apples, perhaps 2,000 barrels, open, not headed, one barrel on top of the other, I don't believe they would freeze here in a cold night. The secret of this is that every apple is a holder of warmth or cold. Whatever the temperature is in the middle of one apple it will be at the outside of it too and there is from five to six hundred

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apples in every barrel, and a thousand or two thousand barrels in a clump like that would have to get the whole body cold enough to freeze before they will freeze in the room, and the room will be held by that body of apples; even if it is not so very warm it will be held. If it goes down, if you leave the doors open until it gets really cold in there, so cold that apples will freeze by thermometer test, shut it up and in just a little while it will come right back to the old temperature, because every apple is a holder of a certain degree of temperature. There is nothing that will take the warm or the cold into itself like an apple, will allow the cold or warmth to go in. But it won't allow water to go in, or the juice of the apple to come out unless it is broken, and it holds it there. I think that is important for every one to remember in building a cold storage, that while a basket of apples would freeze, a whole bunch of apples would hold the temperature to such a condition that they wouldn't freeze.

Now there is another matter about picking apples. The gentleman has spoken about picking in cold or warm, or very cold. In a warm time in October sometimes, we didn't have it this year, cold and rainy and wet all the time—some years we will have two or three days—and I presume you will have more of them here—very sultry and warm. Apples, in my opinion, never should be picked at that time and put into any bulk, in a barrel, in a storehouse, or anywhere else, unless it is where they can cool off again. The man who owns an orchard wants to be careful that he don't pick in those hot, sultry days; putting a lot of apples into a bin when they are hot is like putting pork into a barrel before the animal heat is out of it, all the salt in the world don't keep it. And it is just so with apples. Get them cool, not necessarily so very cool, but get them cool before they are put in.

And about the picking of apples when they are frozen. If the picker picks without gloves—not many of them that will in these days—he will leave marks on the apples where he takes hold of the apple. If the hand is warm it will be very apt to leave a mark on that apple. If they are picked with gloves, I think the gentleman is right. But be very careful about those important points.

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Question. I would like to ask about using cement in construction for a cold storage house, what the experience has been that way.

Mr. Kinney. We haven't any experience, that is, in cement buildings you mean? cement walls? But they must be good if you can hold them, keep them. I have never cemented the bottom of our storehouse because the atmospheric condition coming up from the ground we think is beneficial; perhaps it isn't. It would be very convenient if the bottom of the storehouse was all cemented in rolling the barrels and that kind of work, but we leave it in order to get surface on the ground; that we think helps us quite a good deal.

MAINE FRUIT AS IT APPEARS TO OTHERS.

By A. A. Hixon, Secretary Worcester County Horticultural Society, Worcester, Mass.

I won't trouble you many minutes. I always like to introduce myself before I begin to talk. Unfortunately I am secretary of a horticultural society—not a society that meets once a year, but a society that owns its building, has its own offices, an office that I occupy and occupy exactly the same as a lawyer or a doctor does—I go down early in the morning and I stay there until late at night. Always on deck, always ready to answer any question or questions, and as the librarian of a library always ready to see that people have the proper books that they would like to take out. And we are right in the center of a city of 145,000 inhabitants, exactly on the street where every electric car that comes in from out of town stops and deposits its passengers. We are only one floor up. We have twenty-six exhibitions a year. Every horticulturist and every agriculturist that goes through the city of Worcester and has time to stop generally comes in to see me. I have been there seventeen years in charge of that property, and its exhibitions. We have twenty-six exhibitions a year and for seventeen years I have had sole control of twenty-six exhibitions a year, and for the eleven years previous partial charge and clerk of the committee of arrangements; consequently somewhere from twenty-five to twenty-

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seven years of my life I have held and handled twenty-six exhibitions a year. I hardly think there is another man in the United States that has such a reputation for exhibitions.

Now, I have been asked to say what we people outside of the State of Maine think about your fruit. Hardly any necessity to tell you anything about it. You know just as well as I do, and a little bit better. You know that the Kennebec Baldwin has had a national reputation for years and years and years as far back as the Revolutionary War. I think you had Baldwins, or you had apples on the Kennebec river that sometime later, or after the Baldwin came into existence was grafted into Baldwin apples, and the reputation of the Kennebec Baldwins is that they are the best Baldwins that are grown in the world. Now what more can I say than that? And you have a reputation for growing Northern Spies that equal the best Northern Spies, and perhaps better than ever came from the state of New York. What more can I say for that? And there are lots of other kinds of apples that come from the State of Maine that have that same reputation. You can grow a better Early William than we can in the vicinity of Boston, and you have lots of apples that originated in the State of Maine that came to Boston. I was in Boston last Saturday and I asked the question of a man whom I always go to see, who handles more of the Oregon and Washington and Colorado fruit than any other man in the city of Boston, and I said to him "How is fruit coming in?" "Well," he says, "pretty well. But," he says, "the great trouble is, and that is where the slump in the apple market comes, is that we get too much poor stuff. Come out on the sidewalk and see what we have got." And I went out there and I was surprised that there was hardly a respectable looking barrel of apples on the sidewalk. And I went the whole length up and down two or three times from one end of Boston market to the other, and for the benefit of our friend Kinney, I want to tell you a story on Vermont. He says "I received a letter from Northern Vermont a few days ago asking what we would pay for Tolman Sweets, and I wrote him if he had such Tolman Sweets as he said he had, we would give him $4 a barrel. Now," he said, "come out on the sidewalk and see what I have got." And they lie right on a plate right here on this table. He opened a barrel, and when he opened it, I said "Why, they are not full." "No,"

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he said, "there hasn't been a barrel of them all come within five inches of being full." I put my hand down and took out seven apples, one of them slid back into the barrel, and I laid them on the box, and he said, "Here, you might as well have your whole handful, and I will give you the biggest apple there is on top of the barrel," and he did, and there are the seven apples on that plate there. Those are the Tolman Sweets that were sent to Boston as an extra lot of apples. He sold several barrels of those apples to a man for $1.50 a barrel without looking at them. The man sent them back to him and he was there while I was there, and he says, "You can sell those for anything you are a mind to, and you needn't pay me the difference between what I get and what I paid for them, because I would not like to have it said that I came down here and bought some apples and I sent them back and took the money you received from them." And he was offering them for a dollar a barrel.

A letter was received from the man in Vermont: "Dear Sir: There seems to be a big difference between what you told me you would pay for my apples and the check you sent me, and if you don't send me the difference between what you told me you would pay me and what you sent me there will be trouble." The gentleman in Boston says, "That is one of the things that we commission men have to deal with." There are two sides to the apple question. There are two sides to everything, and I wish that I dared tell friend Kinney who the man was, but I never give away such things.

Mr. Kinney. I don't think Maine has gotten up to that point where they can have their apples sold as many times as we Vermont people can.

Mr. Hixon. I haven't got to the Maine people yet. Yesterday some one sent me out to ride to see your beautiful city, and I want to say right here—I wish the mayor was here, I wish I could have said something to him last night after his talk—you have got a pretty city, you took me to a beautiful place out here below, one of the finest places, natural places—I am a believer in nature and not too much of the ordinary fixing up that we get—and that place of Mr. Gardiner's is a magnificent natural place, and you have got a magnificent little city here, magnificent views and scenery, and old-fashioned colonial houses, and new fashioned houses, and every one of them well kept, and your

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streets well kept as such a hilly town can keep its streets—so much for your town. Now when I came back from there I felt a little chilly and my wife and I walked across the river up and down the streets, looking into your business places. A gentleman said to me last night, "Oh, ho, you think more of the business of a town than you do of the horticulture, do you?" I says, "No, sir, if you want to know the reason why I went out on the street, I will show you after supper." So I went to a store above here and said to the man "Give me a couple of quarts of those apples." He said "All right, sir." He sort of tried to apologize for the looks of the apples that he had in his store. The man was so ashamed that he said "As long as you are a delegate to this convention I won't charge you anything," and I says "I am going to give you ten cents." And I gave him ten cents for them. Along the other side I saw some pears as bad as those if not worse, and I had a good mind to buy some of those and bring them here today.

Now I am not saying these things to find fault or to be smart or anything of the kind. I simply want to show you that there is an everlasting lot of poor stuff that gets into the market, and it is the poor stuff that drives your good stuff out of the market. Now why do you suppose such apples as those Jonathan over there sell in Worcester, Boston and New York and every other large place? Suppose any one of you was going to have a little party, one of your children was going to have a party and you wanted a dozen bananas, a dozen oranges and a dozen apples to put on the table. You can get your bananas and your oranges and you can trust to your marketman to bring them up, but what will he bring you for apples? Now isn't that too bad to say, when we are in the best apple section in the world, the New England States? I want you to understand that I am in favor of fruit growing in Massachusetts, Vermont, New Hampshire and Maine, and if I was a young man today I would put every single cent of money I could into fruit growing. Last night I heard an old gentleman say here if he wasn't in the fruit business he wouldn't go into it, because it was the poorest part of agriculture. The old gentleman didn't know what he was talking about. Now if a man goes into the boot and shoe business or into the lumber business he puts some thought into the matter; he puts capital into it. He isn't a bit disconcerted if some-

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body in New York doesn't pay a bill of two or three thousand dollars; he keeps right on with the shoe business, doesn't he? keeps on doing business—he puts every dollar that he can get into his business. What does the farmer do, or the fruit-grower? He buys a few trees and then he won't put another cent into it if he possibly can help it. Now if a man is going into the fruit business and set out acres and acres of trees, he wants to go into it understandingly; he wants to make up his mind that he is going to spray and dig and harrow and pack—and he has got to have the proper place to put that fruit. He mustn't go to work and raise a thousand barrels of apples and then when he gets ready to pick them have no place to put them. That is not business, not a bit of it; that is only one part of the business. He must have his cold storage plant and he must be in shape to take care of that fruit, and be in shape so as to go into the market, and put the fruit into the market when people want it, and not put it into the market when he picks it or have it spoil on his hands. That is not business, not a bit of it.

And let me tell you another thing. Here is another man got a boy or girl, three, four, five, six, seven years old up to ten, fifteen; he puts $25 in the bank for that child, so as to have a capital for it when it gets old enough to go to school, college, or somewhere else, or go into business. Why not take a five acre lot, the best you have got on the farm, and set it out to trees and let the young man or the woman have the trees, show them how to take care of them? Don't you think in ten years from now it would produce money enough, well, to put the child into school and perhaps carry them through school? I think it would. I think if the stories you told here last night about the two or three thousand dollars that you received from apples from a certain number of trees—I think if you had five or ten acres in Northern Spies or Baldwins or in some other variety, that you would have a real good bank account for that boy or girl. And that wouldn't be all, you would be teaching the boy and girl the very business that you ought to teach them to follow in your footsteps. If you expect the horticulture of this country to live, you have got to have somebody to follow after we old fellows are dead and buried. Let me tell you an incident. Attending a meeting like this, some one unfortunately sprung an educational sort of a question on the meeting and they got

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to talking education, and they got to sort of throwing mud at their State College. It wasn't a pretty thing to do, and the President was smart enough to call them to order and asked me to take the floor, which belonged to me. And I said I very seldom dabbled in educational problems because I had a theory of my own, and it didn't work with other people's theories real well and so I very seldom had anything to say about it, but, I says, I want to ask you one or two questions right here. How many of you men have got boys in that agricultural college? Not a single one of them. How many of you women will be proud to see your daughter marry an agriculturist? Not a single person in the audience said yes to it. How under the sun do you expect an agricultural college to survive with such treatment as that? And why in thunder did those people find fault with that agricultural college when they didn't have one single interest in it? If there are any of you people like that in the State of Maine, keep it to yourself; don't say anything about it. Don't find any fault with your college if it isn't doing as you would like to have it do, if you haven't got a representative there. I was glad to find that you had a young lady there from our state, proved to be a relative of my wife and she didn't find it out till this morning, and it was kind of funny that she should drift from our state into the State of Maine to help you people out. She is connected with the insect department and I presume a good many of you know her.

Now two or three years ago a young man came in and he said, "Bro. Hixon, I want my boy to go to college for a short term in horticulture, and I have tried and I can't do anything up here with Amherst, I can't do anything at Rhode Island, I can't do anything in Connecticut, not as I would like to do, nor New Hampshire, and the only place left for me is the State of Maine, and he wrote down to Orono. And he came down here and went through the course in good shape, came back and went to work for a greenhouse man near by and is doing first rate. That all speaks a good word for your college over here. And I am sorry to say that until the agricultural colleges meet the farmers' boys half way and take off some of the educational restrictions, that they are not going to make as many farmers as they ought to make. I don't think a boy ought to graduate from the high school before he can start out to study and to

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learn agriculture. There ought to be some way for him to get into that agricultural college without being obliged to go through college. When he gets through college he has got an idea in his head that he won't work for his living, and then he tries to see how near he can come to that and generally he fetches up on an electric car as a motor man.

Now about cold storage, I want to say this one thing. Cold storage from a professional standpoint is not always correct. They do carry it to such an extent that they fairly kill the life of the fruit and when it comes out it is no good. They get it just the least little bit too cold. But home storage, I never saw that trouble at all. Now I speak because I know. I have tried and taken home bushels and bushels of apples that have been through cold storage and they were just about as good as an old wooden ball—they were not good for anything. So if you ever try cold storage don't get it so far down that you kill the life of the fruit entirely. Give it an opportunity to sort of ripen up after you take it out of cold storage. Cold storage for fruit that is exactly in condition today is all right, as cold as you like to keep it, and you will have to use it immediately upon taking it out of cold storage. But fruit that you are keeping to sell and has got to be exposed in the market must not be in that condition when it is put in and it must not go so low down in the degrees of cold.

Something was said about varieties in my hearing yesterday. I am sorry to see you people going down in quality of fruit. Don't put in the Ben Davis even if the market will pay you for them. There is going to be a time that people will demand something better than Ben Davis or the Stark or such apples as that. You people have got a good reputation for Northern Spies, and stick to your Northern Spies. You can't do much better than Baldwin, provided it is hardy with you. You people must determine that for yourselves. I can't come from Massachusetts and give you any advice whatever in regard to the hardiness of your varieties. That you will have to test for yourselves. But because Friend Jones over here can't grow it, don't you think that you can't grow it. It doesn't take more than two or three hundred feet remove from one spot to another to get from a bad location to a good location. And when you

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ask me what kinds you should grow, why take the kinds for the present that you can sell in the market, but all the time be trying to produce something that is a great deal better. Quality will pay in the end if it doesn't just at present.

Now in regard to varieties of fruit in the setting out of an orchard. I want to tell you something that I am very much interested in and something that is interesting lots of other people, and that is this. You want to know the reason why there is so much difference in the Baldwins, why there is so much difference in different kinds of apples. The original Baldwin originated in Essex county between Newburyport and Boston, and everything of the Baldwin kind came from that original tree. As nurseries developed in the Western States, the Baldwin was carried west and further west, and by and by you people in the states of Maine and Massachusetts and New Hampshire want Baldwin apples and you send out there and buy them, and they come back here a little different kind of Baldwin from the original Baldwin. Why? Because they have become acclimated out there. Let me say to you that the Roxbury Russet taken the other side of the Mississippi river will grow very large and will be a fine apple. Suppose some of you should be struck on that apple and should send out there for scions—do you think you are going to have the original Roxbury Russet? Not by a good deal. That is just the trouble with your Baldwin apples and every other kind of apples; you shift the location, and you bring them back, and you have got something else. Now I went down to Rhode Island to talk the fruit question one night. As I was talking along, using a man's orchard for an illustration of three different kinds of planting,—one before he was born, and another lot that he had set out thirty years before, and only set them twenty feet apart and they were so close together that a spear of grass wouldn't grow under them—he never was troubled with grass or weeds growing under those trees—then a new orchard that had been set out about seven years that was bearing about three barrels of apples to a tree,—and he stopped me right in the meeting and said "Friend Hixon,"—he is a Quaker—"It is all right for thee to talk the way thee is talking, but I would give more for the Baldwins and the Rhode Island Greenings on those old trees that I know to be eighty-five years old than I would all of these new trees I have got in these lower

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orchards." I was glad to hear him say it because the old trees were grafted from the original trees in Massachusetts and the young trees came from the west. And we older people here never have seen a Rhode Island Greening as good as the old Rhode Island Greenings that we used to have on the old trees. Now if you know trees that are bearing the right kind of fruit— if you know the Gravenstein, if you know the McIntosh Red, the Wealthy or any others that are growing on trees that stay on as long as they ought to and you have an opportunity to pick them instead of picking them off the ground, you buy any kind of trees from an orchard that has got good roots, and let them grow one year, and then graft from these trees that you know to be satisfactory, that you know to be hardy, that produce the fruit that you would like to produce, and you will be all right. I have had that thing happen in the state of New Hampshire, clear way up to the foot of the mountains. and I have letters at home thanking me for the scions that I sent them, and stating that they had taken premiums at the state fair from trees that they had grafted from the scions that I sent them on the little seedlings that they picked up around on their farms, where the trees that they bought from the west had not produced an apple yet. Now conditions govern everything. Don't you think for a minute that the trees that they grafted in the state of New Hampshire produced fruit any quicker comparatively than the trees they bought in the west, because the seedling trees instead of being a year or two old, may have been five or six or seven or eight years old, you see. I always like for every single identical thing that I possibly can, when I am doing anything of this kind, to see that I am strictly correct. As A. A. Hixon I wouldn't care, but as secretary of the Worcester Horticultural Society, I am mighty careful that what I say will hold water. I pride myself that every single bit of information that I give has been thoroughly studied from one end to the other. And if you all would do that thing and not jump at conclusions you would be a great deal better off.

Now just a word, because there are so many ladies present— there are other things besides apples. I don't know what you can grow here but when I was a boy and lived in Bangor, I know they had peaches and plums and grapes and currants and other

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things, and if your men folks are so bound up and so taken up that they can't grow anything but apples, and you love the other kinds of fruits, see that you and the boy and the girl have a piece of land near the house and that the men folks plow it up and put it in good shape for you, and that you have everything in the fruit line that you can grow in the State of Maine, and not only that, but encourage the children in fruit growing. Keep them out of doors. Give them an opportunity to learn what there is to be learned. Now is that advisable? And I speak because my heart is in that question, and those of you who know me know that the children do pretty near as I ask them to do. We have two exhibitions a year that we appropriate $50 each for, and Horticultural Hall is not big enough to take care of the exhibits of those children. I have been to Boston, the Massachusetts Society's exhibition, I have taken in every town and city that has requested me to take in their exhibitions, and to judge and to advise and talk to the children, and I do lots and lots of that kind of work. And I am going to say in conclusion that I have two grandsons, one three and a half years old and one five, that had a garden this year, and a garden last year, and this year, the five year and a half boy took the second prize in Boston for the best collection of vegetables grown by a child under sixteen years of age, and his grandfather bossed the job so that he knows that it is as honest as anything can be in this world, and that the children did their own work excepting the plowing of the ground. I used to go out with them and sit down and see them do the work. When the little fellow was four years and a half old he says to me, "Grandpa, I want some of that nasty, stinking stuff that papa uses in his garden." And I said, "Well, young man, go and get your tin pail—a pail that would hold four quarts perhaps—and go down to the barn and get it." And he went down and got it. "Now," he says, "how will I use that." "Well," I says, "you have seen your grandmother and your mother make bread, and scatter flour on the board. Now you scatter that nasty, stinking stuff in that row just as you have seen your mother scatter the flour when she makes bread." He went and did it. I says "Do it over again, because you haven't got enough; rake it back and forth." After he shelled his corn, he said "What will I do?" I put my foot there, and then there, and so on,

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and I says you put a few seed there and there and there. And when he got his corn planted, then I had him plant his beans and potatoes and tomatoes—no, not his cucumbers, but summer squash. And then he says to me "Ain't I going to have any cucumbers?" and I said "Why, yes, only I haven't any seed at home. When I come home I will bring you some." He kept track of it and when the proper time came that year at our own exhibition the little fellow got the first prize on butter beans and the second prize on green, and there were seventeen entries on the butter beans and eighteen entries on the green pod snap beans. He went out and got those beans and washed them and rinsed them and put them on towels to dry them and put them into a box, and when he got down to the hall and when he went to Boston, both years, he wouldn't allow a single person to help him. One old lady down to Boston, says "You dear little fellow, let me help you arrange your things." And he says "This is my exhibition, it ain't yours." That settled it. And the pictures of these children have been in almost every paper in the United States, in the Boston, Springfield, New York, Chicago and the Western papers, and I answered a postal card only a day or two ago for the little fellow from an ex-rebel soldier from the State of Washington, asking him how under the sun he managed to grow tomatoes.

One little story more about my grandson. The 10th of October our Society has an exhibition similar to this. It only lasts one day. At noon time we have dinner. Our old president, now deceased, was always partial to being hospitable and having a dinner to which he could invite his friends and have a little speaking after dinner. It would be very much such an affair probably as you are going to have tonight. At breakfast time I said to the little fellow, "Now Stanley, if you are a good boy you can come down with your mother and have dinner with grandpa at the hall today." He says "All right." A little while after I had gone away he said to his mother "I am going over in the garden and get some things to exhibit." Now it was too late to get anything. There was some little bits of beets that weren't larger than a quarter of a dollar, perhaps not as large as that. He pulled up a few of them. They were not worth pulling up. And he found a cucumber turned yellow, and he found some beans that the wet hadn't entirely spoiled.

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He took them over to the house and told the other boys, the little fellows from one of the neigboring houses, that "you mustn't cut the beet tops off close because if you do they will bleed and all the sweet will come out of them." You see he had heard somebody say that. He fixed them up and put them in a box and brought them down town, and he says "Grandpa, here is my exhibit." And his mother said, "Don't bother grandpa with that." Why, I wouldn't have had that child set on for $50, because it isn't the proper way to do. If he shows any disposition to do anything, encourage him. And I allowed him to put them on a plate, and about that time dinner was announced so I had to go in. When we came down the little fellow noticed that his plate was still in the library on my table, and he said "Ain't I going to have that taken into the hall?" I says "Sure." He and I carried it in and he got a fifty cent gratuity on it. That is the proper way to use children and encourage them.

THE GRANGE CO-OPERATIVE COMPANY.

By W. T. GUPTILL, Topsham.

Now I prepared an article to read to you as I supposed the dignity of the Society would demand, but it would be much easier for me if you would lay your dignity aside and dip into me with pertinent questions or any other questions regarding our company, which is a co-operative company of the grange, and let me answer those questions as they come, and you would find in that way exactly what I know about it. What I have written is in regard to the need of a co-operative movement; it is the argument that brought us down in Sagadahoc county to study the question as you would a problem in mathematics. We had first a committee in Sagadahoc county, and afterwards a committee composed of the Pomona Granges, for two years. At the present time the company is a living reality—I mean to say its stock is subscribed for and at the present time we are exactly in the situation that the United States was after a treaty of peace was signed with England, before the constitution was adopted. We are not in a shape to do business at the present

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time, because it is a temporary organization. It was formed with the intention and the purpose of being temporary. Our next annual meeting comes during the State Grange. We apprehend that the Granges are going to take hold of it. We want them to. It is open to every one at the present time to take hold, whether they belong to the Grange or not, but as long as the Grange was behind it we propose to submit it to them whether they will admit people who are not grangers or not. Now, if you will pardon me, I will read what I have prepared, and then you can take hold and ask me all sorts of questions; I don't care even if you consider them impertinent, I will be very much obliged for them and I will answer them civilly as I can and thank you for it.

When we begin to talk about co-operation it shows in itself that we are dissatisfied with the present methods of collection and distribution of the necessities of life, and that we are turning first to one thing and then another to get, if we can, a legal right to the dollars that we believe morally belong to us. All of us agree that we want nothing which is not ours by right, and what is ours by right we *will* have if any one can show us the way to get it without the use of force. Co-operation therefore resolves itself into a question of economics and enters the field of political economy, which works out beautifully in theory, but in practice trade is controlled fully as much by the habit of doing business in a certain place with a certain man in whom we have confidence, as by the extra dollars we receive. Of course trusts, which are comparatively a new element in political economy, eliminate all phases of trade except the dollar problem. The friendship of the buyer and seller and also all confidence which unrestricted trade demands are gone; you take the goods and pay your money, you can get them nowhere else. Now in all fairness I want to say what a heaven this must be to the man who has got absolute control of the source of supply. If we could control the entire output of apples in this country, or as nearly control it as the Standard Oil Company does the oil supply, why I would call off several old scores which I have been trying to pay for years. The fact is, no family uses one half as many dollars worth of oil in a year as they do of the various kinds of fruit, yet the Standard Oil Company has made

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fortunes of immense size for dozens of men, and oil was not a commercial article more than forty or forty-five years ago.

But farmers produce something besides fruit, and there certainly ought to be a dollar somewhere for the producer or the vendor of all these staples. The Standard Oil Company can pay a fine of $29,000,000, the assessed amount of all the wild lands of Maine, and Rockefeller owns up that he is worth $300,000,000 made within one generation on one staple. Is it possible that in staples as little used as oil the foundations of such fortunes as this are laid? We can scarcely believe our ears. But if it is true, what ought to come out of the proper handling of the big staples like corn or wheat or potatoes or fruit?

You probably will ask if it is our intention to control the supply of food products, and in reply I am obliged to ask if there would be anything illegal about doing such a thing. For twenty-five years every conceivable kind of a combination has flourished and the only obstacles they have encountered have been here and there a pious exclamation from some good man. No legal obstacles have been raised. And the man who opens his eyes now upon present business transactions after his sleep of twenty years in the Catskills will be more disturbed and undone than was poor old Rip by the events of the Revolution.

Let us not make the mistake of apologizing for what has survived the destructive criticism of a quarter century. It has been pruned back and pruned back until the root and top are in the healthiest condition, and we may as well face the fact that the business problems of the future are the problems of controlling the supply.

We have organized this company however not on the gigantic scale. Until recent days the king of every farm was going to be the king pin of the whole country, and there is too much of this spirit yet to be absolutely certain that farmers will get down and pull together. So we have begun small and humble. We want —we are bound to win the farmers' confidence, to have him come to us for advice as to what to do with his stuff, and we are bound to give it.

We are bound to have sufficient capital to carry through any trade without loss to the man who sells to us or intrusts us with his wares. We hope with time thus to build up a confidence

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and thereby enable us to form a larger and more powerful company.

Now it is almost impossible for a board of directors as a whole to take up the general line of products in the State of Maine, hay, fuel, butter, apples, potatoes, etc., and carry it through; consequently we have hit upon the scheme of appointing three men for directors, who will be virtually elected by the men who are interested in apples, to look after the apple interest, to be responsible for it; three directors who will be elected and probably recommended by the potato growers to look after that interest and be responsible for it; and three for general products; and the nine directors as a whole, as a body, will be the advisers of the president, the electors of the general manager, the overseers of the treasurer, and the general corporation, except at the annual meeting.

Now this company has incorporated itself for fifty thousand dollars, a small sum to do a large business with. It is enough. You understand this is an experiment—and it is not an experiment entirely either, but it is an experiment that everybody is trying. I see by the papers that even the milk producers around Boston are tackling the same proposition and tackling it in exactly the same way, only they don't intend to cover the same general field that we do. Of course we are not in the milk producing business. This is a general company, where a man can send a bushel of apples or a bushel of potatoes, and have it understood that it is in the hands of his friends, that it is going to a party that is absolutely reliable, that he will get fair usage. We have got to begin to do business somewhere. You understand we could not open an office in Portland unless we did it by a system of drumming as the commercial houses do and go out and buy a car load of apples or potatoes, and so on and so forth. And Aroostook county is very much alive to this proposition, and is up against propositions that we don't meet here, because buyers of potatoes down there are in league and won't pay only so much for potatoes anyhow, and they have notified the wholesale houses in Boston that if they receive potatoes from anybody except the shipping houses that the shipping houses will blacklist them and that they won't ship to them. Now such a case as that, you see we have got to have immense transactions

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and we have got to have a perfect system. The system is worked out practically. Now I can't give the details to you, because it is too long and I must be brief. However I want you to get some idea and if you will kind of follow the thing along we will try to elucidate it to you in private or in public or any way. We have got to start, as I say, doing business in some particular place. For instance, if you buy potatoes, you have got to have a potato house. That means a responsibility. Now potato men are the men who really are in this, who happen to be sent by the Pomona Granges of the State to form the organization. We however don't propose to turn this over entirely into a potato corporation, because we see the apple men are meeting the same proposition and the same problems that we meet. Consequently I came up here very readily—although I find it is a good deal of a cross to me and if I live through this I don't think I will ever get in another such a scrape—to say to you that we would like to have you take hold of this proposition and handle it from your standpoint, that is, the apple side of it. I don't know anything about that. Of course I raise fifty or sixty bushels of apples and they don't turn me, well, twenty-five cents I suppose would be a good price for what my apples turn me. Sometimes I sell a few bushels, sometimes give them to my hogs. That is about the way my apple crop goes. If there was a company I could send them to and knew I would get fair usage, why I would do it at once and take what I got and put it in my pocket and call it a present. But as I say, we were potato growers, most of us up in Aroostook county—this man, that man and the other man, when we got together we found we were potato growers instead of apple growers. We decided that in order to start business, and we don't expect a great deal of capital at first, perhaps not more than a thousand or two dollars, that it was necessary for us to start doing business in some place where we could do a business that would pay these men that were engaged in that business the same as if it were a private corporation, that is, as though it were not intended to be a general corporation. Consequently we are going to try to begin to do business up in Aroostook county, and the president of the company at the present time—it is only a temporary organization and there is no probability that he will be re-elected—is

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Columbus Hayford. The directors are composed of the directors sent by the different Pomonas at our meeting in Augusta in September. We hope by State Grange time to have the thing thoroughly digested so that we can ask certain men to act in this capacity and that they will be efficient and satisfactory men.

Now when we get it so that it will work in one town in Aroostook county, we will make it so that it will work in any other. What will work in one place will work in another. After we have solved the problem of the unit we have solved the problem of the whole. Some people say to me that are interested in this, that have listened to it and followed it along, "Well, what is the first thing you are going to do?" Well, I know definitely what is the first thing we are going to do if you leave it to me. Of course there are other people to be considered, but if you were to leave it to me, I know definitely what I would do, just the same as though I were a young man and had studied law and was going out to practice law. What is the first thing you would do in such a case as that? Why, I would go and hang out my shingle and engage a room. That is the first thing I would do. The next thing I would do, I would join the Masons and the Odd Fellows and the Knights of Pythias, and I would go round and I would try and convey the impression that I was decent and respectable, and I would go to some business man and say "If you have got some case that don't amount to much, that your regular attorney can't attend to, I would be much obliged to you if you should turn it over to me," and the old fellow would look me over and say probably it will help the fellow out some and I will do it, and he would give me some little collecting to do; and I would try and be efficient and win his confidence, and in that case perhaps he would turn another over to me and before I knew it I would get money enough to pay my board. Now that is an essential thing. After I had done that I would work along and by and by before I knew it the old gentleman would be coming up to my office sometime when his regular attorney would be out of town, and he would have some important case on hand, and he would say "Can you handle this?" I would tell him I could, and if I couldn't handle it myself I would go and get somebody to inform me. That is what I would do if I were studying law. What would you do

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if you was going into this business? Wouldn't you start out and build up a business of taking in and putting out products? It is the confidence we are after. We haven't any historic past. We have had a couple of years just simply a meeting of a lot of men from all over the State for an hour or two at a time to discuss a problem which it needs days and months and years to study out. As I suggested when I began—I would be very much obliged to you if you would fire questions at me, and I don't care how impertinent they are, nor how much to the point they are, if you want to know anything about this company that I have not said, or what we intend to do, or how we are trying to work, or anything of the sort, and I will try and answer your questions and show you whether we have studied it out or whether we are making a bluff at it.

Question. Do you sell stock, and what is the price, and how much does a man have to buy to get in?

Mr. Guptill. I am much obliged to you. I ought to have told that. The price of the stock is $10 a share, and so as to have it go around we will limit it perhaps to fifty shares—that would allow a man to have $500 invested in the company; perhaps he wouldn't want only ten. But if he subscribes for $10 it makes him a voting member of stock, and if he has $20 it makes him a double voting member, and if he has thirty he has three votes, and $100 he has ten votes. Of course such things are determined by law. The shares are $10 apiece. I want to say just, a word further. If there is anybody that wants to invest, the certificates of stock are not yet issued but Mr. A. E. Rogers is the secretary of the company and if you will give him $10 he will give you a receipt for it, which is exchangeable at the time the certificates of stock are issued for a certificate of stock. As soon as you pay your $10 you will be eligible to vote and will be a member of the society at the State Grange.

W. D. HURD, Dean of College of Agriculture, University of Maine.

It is perhaps fitting that your State College, the University of Maine, and especially the College of Agriculture, a part of that institution, should be represented at this time. The president and secretary of the Association last night told you of the great

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progress that had been made in horticultural lines, and I think if you were to look over the factors that have contributed to that great progress, you would find that progress was due largely to the State Colleges, the Experiment Stations, the Farmers' Institutes, the United States Department of Agriculture, the State Departments of Agriculture throughout the United States and the agricultural press. I only wish that Dr. Fellows, the distinguished president of the University, was here to bring you greetings from that institution. But I will say that I bring you the greetings of the institution and with it a number of students that I am sure will be a surprise to most of you. There will be in the catalogue that is now in the hands of the printer 788 students this year in that institution. And what is more, I would like to say before you representative men and women that 90 of those students are catalogued in the College of Agriculture, a somewhat larger number than was there a few years ago. I don't know whether Mr. Hixon is here or not, but if he is I would like to say to him, and I would like to say to all of you that we who are laboring along agricultural educational lines are glad to have men from other states come to recognize our work as Mr. Hixon did yesterday, and if Mr. Hixon had asked for a show of hands in this audience as to whether there were men who had sons in that institution studying agriculture, he would have seen more than one hand raised. If he had asked of the ladies if there were any here who had daughters, he would have seen at least one hand raised, for I know the mother of one young lady who is taking agriculture was here yesterday. I think that is a good indication.

I don't know that I could do anything better in speaking for the College of Agriculture of the University of Maine, than to tell you very briefly what we are doing or trying to do at the present time to directly help the farmer. The main idea in our agricultural education used to be to teach courses of different lengths in the colleges. That idea has changed somewhat. President Gibbs of the New Hampshire Agricultural College last spring in a conference in progress in Boston, said that the greatest problem of the agricultural college today was how to help the farmers. Now we at the University of Maine recognize the duty we owe to the farmers of the State as well as to the

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students who come there for instruction, and I will briefly mention some of the things that we are now doing to help the farmers of the State. I will not say anything of the Experiment Station. Dr. Woods has already mentioned that work, and you all know of the worth of it. I am simply speaking for the College of Agriculture now. We have, of course, our four year course in agriculture, in which we are teaching scientific agriculture. There never was a time when there was the call there is today for trained men in these lines, and I would not agree with Mr. Hixon in the four years' course that we meet the boys half way, but we must keep that course up to the standard in the medical courses, law, and all other professions. Now I would agree with Mr. Hixon that we should meet the boy half way in other courses; and to meet the boy half way, the boy who is not fitted for a college education, or university education and a graded four years' course, we have a two years' course to which any boy can come who has had even a common school education and we will give him a good practical education that will make a better farmer out of him. So much for what we are giving at the University.

Now our extension work, carrying the work all over the State. We have recently established a department just for the benefit of farmers, beginning January 7th next, which covers the general lines of fruit growing and general farm products, and dairying and animal breeding and feeding. Following that course we shall have our second annual farmers' week. The first one was held last March and we were much gratified to know that 116 men and women representing fourteen counties in the State, came at that time. They asked us to give another one next March, and the 7th of next March we will have another farmers' week, and we hope the number will be trebled, or four or five times as large. We are making preparations to keep every one who comes if we have to go to Bangor for accommodations. Besides that there is a poultry course. In the extension work last summer we tried another experiment. We offered to send men who carry apparatus with them all over this State, right to the farmers, to give demonstrations. The fertilizer question, the question of testing milk, the question of pruning and grafting, the question of spraying, are important enough so that they

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ought to be taught all over the State, and we sent men with pieces of apparatus to sixty different localities in this State last summer, and held sixty of these meetings. They have proven very helpful. They have proven valuable and we are going to develop this work further. We are going to put our whole force into this work next summer. You can reach the farmers better on their own land than anywhere else.

Now beside that I shall have to mention some other things. At the present time we are sending lecturers all over the State, simply asking that their travelling expenses be paid. We have to have that. We couldn't keep five or six men travelling all over the State with our present funds, and we think our lectures and talks are certainly worth the expenses of the lecturers.

And for those who can't come to the University at all, even for the one week, we are giving correspondence courses. We have over 100 now taking this work by correspondence, absolutely free, don't even charge you for postage. All you have to do is to send in your name and we will send you a circular describing this course. How far this work is going to be a success depends largely on the farmers. We believe it is the duty of the State University to help the farmer; we are willing to do it and, as I say, the success of it depends largely on how much the farmers of the State want it. I am sure the trustees and the president of the institution, if necessary, will hire any number of men to carry on this work through the State as it develops. So I hope you will all come for this extension work and ask for more of it than you have had in the past. I thank you.

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THE SIZE OF THE APPLE PACKAGE—THE BARREL.

F. H. MORSE, Waterford.

I realize that at this time my subject is rather a dry one to bring up after having so many subjects and so many good speakers.

Perhaps some of you who attended two years ago remember my speaking of the difference in size I found in measuring different barrels. I afterward received two letters from Mr. F. D. Cummings, the apple buyer of Portland, to whom I had sold our apples for two or three years, and who had been at our house. He wrote to me, saying that he wished I would use my influence with the State Pomological Society to induce the legislature to pass a law placing a standard size upon the apple barrel; that there was nothing in his opinion that would so help the sale of our apples in foreign markets as to have a standard, uniform size of barrels.

Before I go into the barrel question any further, here is a letter which he wrote to Mr. Knowlton in answer to his writing to him and asking him up here at this meeting:—

Inclosed find a short paper on the question of apple barrels. The matter is of great importance to the whole State and I trust will receive the attention which it deserves.

Yours truly,

F. D. CUMMINGS.

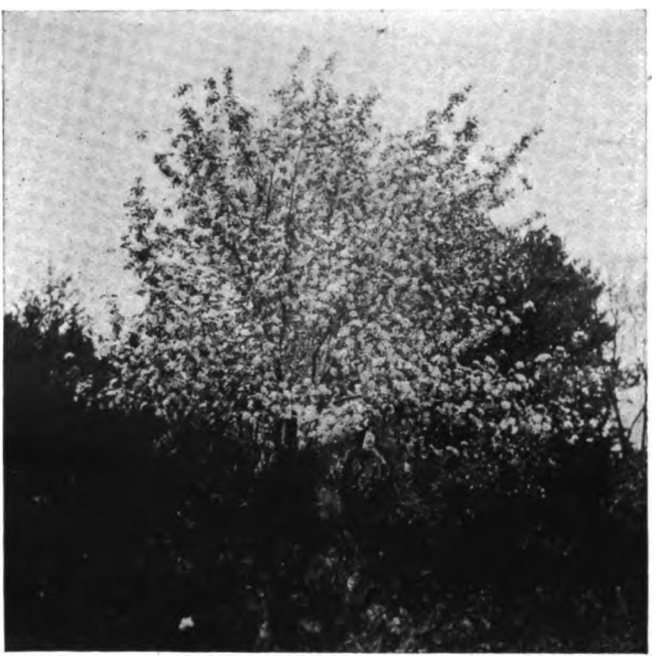
I regret exceedingly my inability to be present with you and to render what assistance I could in the discussion of a question of importance to one of the industries of the State.

The apple industry of Maine is a very important industry, and is capable of vast increase in importance and profit over what it is at the present time.

In no place in the world can better Baldwin apples be grown, with proper fertilization, spraying, pruning and care, than can be grown among our New England hills.

Did the subject for discussion permit, I should be pleased to say more in this line of thought, but we are invited to discuss, not apples, but barrels.

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MAINE FARMER PRESS, AUGUSTA

Specimen tree from nine-year-old orchard of
Horace M. Paine of Jay

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Have been closely connected with the apple business in this State, both as a buyer and exporter, for more than 20 years, I am able to speak from a good amount of practical experience.

Take any product you please and tell me if the package which contains it has not a great deal to do with your being attracted or repelled in the consideration of its purchase.

If the package is old, or broken, or dirty, you want one that is not old or broken or dirty. If they vary in size, you want to be sure as to which size you are to get.

There are three qualities which an apple barrel should possess: namely, neatness, strength and uniformity.

If you consider my experience and judgment of any value, I ask you to consider that these three things are essentials. That the statement is not merely an academic or theoretical notion, but hard, stubborn fact, that means dollars as well as pride and satisfaction.

New England is the only place where apples are packed in old flour barrels.

Maine seems to be the only State where the barrel maker has made anything he pleased for an apple barrel. Made it of any size and out of any sort of material. Hooped it with ash, with elm, with gray birch, or with hay wire, and called it an "apple barrel." Happily the worst of this has passed away; but there is still room for improvement. Some Maine barrel makers are making very good barrels. Others are not.

What competition does Maine have to meet in the disposition of her apples?

She has to meet the competition of the world! What, then, are the essentials from a practical business point of view, that we may be able to meet that competition with success?

The fruit must be of as good quality, must be as well handled, and must be put upon the market in as attractive form.

Situated at the seaboard Maine naturally seeks a foreign market for her apples. In that market Canada is our great competitor. Canada does not, and can not, grow better Baldwin apples than can be grown in Maine. Her fruit sells higher than our own in British markets. Why is it?

There are two reasons. The first is that peculiar quality of the British mind which causes it to pay more for anything grown

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or produced under the British flag, and the second reason is because our barrels are not equal to the Canadian barrel.

The latter objection we can easily overcome if we will wake up and get out of the rut, and by using the same sort of a package and shipping fruit of equal reliability, we can do much to overcome the former reason.

What are the steps to be taken to bring about the use of a suitable and uniform barrel for apples in this State?

First, a law to fix the dimensions of an apple barrel. It is just as righteous, just as proper, and just as fair, to fix the size of an apple barrel as it is to fix the size of a quart of milk or a gallon of molasses. Just as proper as it is to fix the size of any measure, whether it be a quart, a peck, a bushel or a barrel.

Then must the Maine Pomological Society, with the co-operation of the Grange, regulate the material to be used.

There must be no more rough-sawed and unplaned staves, no more soft wood heads.

The barrel makers will gladly conform to any such regulations which their patrons may adopt and require. Co-operation will soon make it possible to establish mills for cutting staves and making hoops, or placing large orders for such material with those in a position to furnish what is required.

Co-operation in production or purchase, means economy as well as uniformity.

A barrel maker, guaranteed the sale of 15,000 barrels at a given price, can make the price lower than he otherwise could, as he can arrange for material at a favorable time of year.

Then, when this happy day for the Maine apple industry has arrived, the prospective purchaser in distant lands will not ask "What sort of a barrel will you use?" or, if he does, you can proudly say: "We Use the Standard Apple Barrel of the State of Maine."

Thanking you for your invitation to address you and assuring you of my deep and sincere interest in the welfare of the Maine apple business, I remain,

Yours truly,

F. D. CUMMINGS.

I will just add a few words to this for the information of those who have never taken interest enough to measure the

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different sizes of barrels which are at the present time being used in the State. When I first began to sell apples, we at that time used wholly old barrels, and as many of you know in buying those we got a good many of what we call small sugar barrels. Well, I thought they looked pretty large and I took time to measure one of them one day and I found they held so much that it was like throwing money away to buy them. So I gave that up. So two years ago they asked me pretty high for new barrels, and knowing that they had the same size of heads and the same length of stave I supposed they held the same as flour barrels, and having an opportunity to buy two or three hundred flour barrels at a good deal lower price, I purchased them. But when I came to get the new barrels home and place them side by side with the old ones, I thought I would take the trouble to measure them, as I raised a quantity of yellow-eyed beans. I filled the new barrel full of beans; then I turned them into a Washburn & Crosby barrel—a good many of you know what those are, a short thick-set barrel—and it took about three quarts to fill it. Then we took some shaved hoop barrels such as the all round flour comes in, and it took about seven quarts to fill that if I remember rightly. Then we took another barrel and it only took fourteen quarts more than the new barrel to fill that. Now that don't seem a great deal on a barrel of apples, but I took time the other day to figure it out to see what difference it would make on this year's crop of apples whether I sold them in these new barrels, and it made the sum of $300, about that—whether I packed them in the new barrel or the larger size of old barrels. So you see though it is a sort of dry subject, it is really a subject of a good deal of interest to us when it comes to dollars and cents, and of course it is not only of interest to us but of interest to the one who buys the apples. They get considerably more for the money with a large barrel than with a small one.

Now, if it is in order, I should like to make a motion that a committee be appointed to look this matter up more fully. Of course we can do nothing about a law this coming winter, until after we have another meeting a year from now, and it seems to me it would be a good plan if there could be a committee appointed to look up the matter. As perhaps some of you

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know, the Canadians have adopted a different style of barrel from what we use here. They use a 30 inch stave and a little smaller head, holds 96 quarts, I think. It seems to me that a committee could look this matter up and report at our next meeting, and then there would be time for a committee to take the matter before the legislature if it was thought worth while at that time.

President Gilbert. The chair would inquire of the speaker if we haven't a legal standard of a barrel already? It was the impression of the chair that we had. If I am incorrect I would like to be corrected in the matter.

Mr. Morse. As far as I am concerned I don't know anything about it. I never took pains to look that up.

President Gilbert. Has Mr. Pope any knowledge in regard to that?

Mr. Pope. I couldn't say.

Dr. Woods. I think the only legal barrel is for the potato.

THE BOX.

By E. L. LINCOLN of Wayne.

The committee has no report to make at present on the box question. I did not know that I was to be called upon to say anything on this matter until I received the program. Although it being a short notice, I will make a few remarks concerning the box question.

The box question will be settled when co-operative principles are adopted by the fruit growers. There is no doubt but what with a different system in buying and packing, that the box under co-operation would come into general use. When I was picking my Spies this season, there were two city ladies observing them as I was hauling them in. One of them remarked "Aren't those nice! and where do all the good apples go to? It is almost impossible to get a good apple in the city. They are all poor and bruised." Well, I knew the reason why. It was not in the growing of the fruit but in the packing and handling of it. I would rather have a No. 2 apple packed in a box as they now pack them in some sections of the country, than to

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have a barrel of No. 1 fancy apples packed by some one unskilled, with a hammer and nails in hand and a barrel header. He commences to press or screw them down which jams them—that would be a good way to make cider, but it is a poor way to pack apples. Apples should be packed so that when they arrive at their destination they will be sound. The better order the fruit is in when offered for sale, the larger quantity will be consumed. Who wants to buy bruised or decayed fruit? All this is detrimental to the grower, especially when caused by packing. Honest packing and knowing how are what pay the grower. By organization you can accomplish the end, but an individual cannot get the price that an association can by its expert packers, and that is what pays the growers. An individual will use a barrel to get them off his hands, while an organization would use a box with their expert workmen. If we want to have standard or uniform packages, we must have local associations.

What we want to do is to organize in the several localities, and then we can bring about the desired results. The box will come into general use when co-operative principles are adopted. Now perhaps it does not make so much difference about the shape or form of the box or package. The shape may be like this box or that one, but it is the results of the system that we want.

What would be the outcome if the exhibitors who bring fruit here should put it into a barrel, round the barrel up at the top, then take a barrel header and press the apples down? What would be the decision of the committee on fruit, beside the other exhibitors? The same view is taken by the consumer when such apples are placed before him for sale, and the grower is the loser.

My first desire in purchasing fruit is to have it perfect and sound, whether it be bananas, oranges, peaches or apples. Quality is second thought. What is quality with a half-decayed peach or apple? Now it is up to the Society to help bring about this end. This is a real matter to decide. The President has told you what Oregon apples sell for in boxes, last evening in his paper. Mr. Pope can tell you what he gets in boxes, for apples in the Boston market.

Mr. Pope. My experience in packing has only been for a few years—a short time, but I must acknowledge that from the

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experience I have had with fancy fruit, that is, good table apples, will bring from fifty cents to two and three dollars more per barrel packed in boxes than they will in barrels. There are several reasons, of course. One is the consumer in our cities as a rule, apples being worth from five to eight dollars a barrel, would not care to take three bushels of those fancy apples home at one time; they prefer to take one bushel. Secondly, they arrive there in so much better shape, less bruised. And for these reasons alone, of course, if properly handled they would bring more money. Our No. 1 Gravensteins this year packed in bushel boxes sold for $2.75. We should have been obliged to get $8.25 per barrel to be equal to the price in the boxes. The barrel apples were selling at that time for about $5 to $5.50. So you can see that it pays if it is done correctly. But at the same time you find that very few parties are willing to take the pains to put them into boxes and put them in in shape, because of the extra trouble. It is more trouble and you must get more in boxes, because, in the first place, they must be faced, every box must be faced the same as the barrel is. Nail the cover on, turn the box over and face the apples, and you come to face three boxes instead of one barrel and there is extra work. Then when we come to fill up and level up there can be no pressing as there is in the barrel. There would be a little give to the apples, and the large distance down from the barrel you can press a little and the apples will give way. But in the box there will be only three or four layers of apples. And are we ready? —very few of us, I think, are ready as yet to sort our apples the way Oregon people do and have every apple in the box the same size, or almost. Then what are we going to do with our balance. We can make up two boxes perhaps, but we are hardly yet ready to go to the pains they do in their large orchards. their large packing houses. You will notice, you go into the market, and you see the Oregon fruit, you will find that the whole box, like the Southern oranges are sorted to a size and packed, certain boxes taking so many apples, the large apples, the next grade taking an apple of the same size but just enough to put it in in layers. Our apples, as we are packing now, must be put in loose from the face and then it is—and well, I sometimes told the boys that were with me when I was levelling up, that it

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required a great deal of skill and perhaps they had better not have their ears open for fear I might say some large words when I was levelling up the boxes of apples. Nevertheless I could afford to take considerable pains with them when I could sell Gravensteins for $2.75 a box, which would probably have brought me about $1.50 in the barrel.

Question. How much more does it cost to pack in a box than in a barrel?

Mr. Pope. I never kept any run of it at all, but I know you put a green hand levelling those boxes up, and well you might want to put cotton in your ears before they got through, but in a short time a person will get expert, and they will set an apple up edgewise if you want to take up a little more room and bring it nearer. You only want a quarter of an inch above the box, give it that slight pressure, because it won't do to press them. Another place you may have to take a large apple out and put in one a little smaller to bring it right. An expert may perhaps do it in five minutes, where it would take a green hand a half an hour trying to level it up. It requires that skill that comes from experience.

Question. Do you sell to commission merchants?

Mr. Pope. Yes.

Question. They have no objection to the box?

Mr. Pope. When we first began, they made objection, they didn't like to handle them, but lately I notice they say "there is a call for boxed apples this week, good fancy apples, send them along."

Question. What is the first cost of the box and the barrel, how do they compare?

Mr. Pope. A trifle more for boxes. You buy your boxes in shooks, do your own nailing, and the shooks will cost a trifle more than the barrels—three boxes equal to a barrel.

Mr. Cobb. Do you use any better grade of apples in the box than in No. 1 barrel?

Mr. Pope. No, we calculate to make a No. 1 fancy table apple, suitable for any gentleman to put on the table. We don't propose to put No. 2 apples in as No. 1 apples, whether it is a barrel or a box.

Mr. Lincoln. There is where organization comes in. A farmer who had small amounts of apples could haul them in and

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have them packed by an expert. Where they do that they have got the apples all uniform. They haven't got to take small apples and big, but take apples one size and fill the box.

Mr. Craig. I am interested in this discussion of the box and the barrel. I think we are not just in a position here in Maine to adopt boxes, although I admire the system, and it is what we would call a higher class of horticulture to use boxes. To get down to the bottom of this thing, we have to learn yet, many of us in the apple business, that horticulture is really the highest branch of agriculture, and until we can learn to handle our apples in the orchard in better shape than is being done at the present time, the box is not what we need—simply because the apple, we have not realized yet that that beautiful fruit is simply a ball of cells covered by a thin coating, and when that is dropped the length of itself into a basket or a barrel, or shaken off the tree as is done, it is injured and it never can be a fancy article, whether wrapped in tissue paper in a box or not. Now that is one reason why we in Maine can't get fancy prices as they are getting elsewhere. We are running this apple business on the basis of potatoes and turnips—I can't express it in any other way. And until we learn to respect the apple and handle it as we would eggs,—and grade them, put our fancy apples in boxes, put our 2s if we have them in barrels, and grade them and mark them; then our men from the old country come over here and buy our apples without seeing them, if we establish a grade and a trade such as they have in other places.

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A MAINE CRANBERRY BOG.

By G. D. LIBBEY, Gardiner.

It may be of interest to know that the cranberry is one of our native American fruits, which has been cultivated and improved until now it is an important commercial product. While Massachusetts raises a large portion of the berries now used there are many grown in New Jersey, Wisconsin, Michigan, Indiana, and some in Maine. In fact they can be raised in any of the Northern states, where nature has provided conditions suitable for their cultivation. The things necessary for the successful cultivation of cranberries is a level peat bog. One where native berries grow is said on good authority nearly always proves successful. Good clean sand near by an ample supply of water controlled by a dam and available at all times.

I will tell you something about the bog owned by the Kennebec Cranberry Co., which I am interested in. It is located about seven miles from Gardiner near Togus. It is what at one time was the bed of Mud Mill pond, so called. Mr. Wellman of whom we purchased the property started the culture of cranberries there over 25 years ago, in the first place cultivating berries he found growing wild. From this start he increased and extended the work until he had ten acres under cultivation, and has raised as high as 500 barrels in a single year. He has shipped them to New York and Boston markets getting good prices and very complimentary letters regarding the color, flavor and keeping qualities. We have been interested in this work only three years. The first year we had a very small crop, owing I presume to a frost in June. Last year there was a fair yield. This year about 300 barrels which I should say is a good average crop for this locality. I understand this to be a small yield for Massachusetts. We are now laying out new beds the width of the bog which is about 60 rods wide. In the first place we put a ditch around the whole piece with enough cross ditches to take the water from the beds with dispatch for it is of utmost importance that it be arranged so this can be done when we have to flow for frosts and pick the next day. After this work is done the whole surface is turfed, that is all of the grass roots

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and bushes are taken off and the beds made perfectly level, after this the whole surface has to be sanded from three to four inches deep. Now we are ready to put out the plants which we are very particular in selecting. The larger portion we shall use are those raised on the bog known as the Wellman cherry cranberry, although we have some early blacks which mature earlier and are ready for market about two weeks earlier than the others. They do not keep as well, and bring a less price in the market. We use cuttings for setting out a new bog, using the sprouts from 12 to 15 inches long of good vigorous plants, placing them in rows 18 inches wide, about 10 inches apart. It takes about three years to get a bog to bearing, but once properly made it is good for many years.

Harvesting the crop begins about the 10th of September, and takes from 10 to 15 days. We use pickers secured from the maker on Cape Cod and like them very much. This can be done on old established vines but new vines have to be picked by hand as the pickers would do more or less damage to the roots. The berries are put into ventilated crates made of slats and placed in a house built for the purpose. These crates are packed in so there is a circulation of air around them all the time. When we are ready to ship them they are run through a separator which takes out all of the dirt and many of the poor berries. After this they go over a sorting table and any that are not perfect taken out by hand.

I don't want to give the impression that this is all that has got to be done to make the growing of cranberries a success, for many nights without sleep is the lot of the man looking after a bog. A frost in June may destroy a large portion of the crop, and the early frosts in the fall are sure to do damage unless someone is there to watch and be ready to turn on the water when the thermometer goes to freezing. Besides this there are insects of various kinds that destroy the berries and vines so it requires constant care and attention to successfully grow cranberries in Maine at least. But I am satisfied that under proper conditions that this crop can be grown profitably.

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Hon. A. W. GILMAN, Commissioner of Agriculture, Augusta, Maine.

I just want to say to the people that I am very glad to meet with you here this morning. The first time that I learned that I was to have an address for this occasion, it came from my friend Mr. Boardman of Bangor. He wrote me that he wanted a synopsis of the address that I was to deliver here this morning. The Department of Agriculture is very much interested in the State Pomological Society. We have a man with us well trained in this part of the great farm work.

The apple is the king of fruit and it reigns supreme the year round. That is the beauty about the apple. It is not a fruit that is for a little while, a short time, but it is year-round.

I have with me today on my force a gentleman who is well versed in this line of work, Prof. Card, and I told your President sometime ago that if he would let us know when this meeting was to occur, that we would suspend the Farmer's Institute and I would bring my forces down here and we would take you by storm. We are here this morning. I am not going to deliver an address along the line of fruits, but I am going to say this, that the Department of Agriculture through Prof. Hitchings has done much this year towards this special line of work. You know that news came to us that a larger per cent of our apple trees this year were destroyed than any previous year, and the professor set himself—after consulting with the officers of the Pomological Society about it—he set himself to work, by employing men, to see if he could investigate and learn what was the cause, and to prevent it in the coming years if possible. Just how far the professor has got along with this, I don't know. I haven't seen him for some time. I assure you the Department of Agriculture is with you in this work. At any time and under all circumstances you will have the entire support of the whole department.

I thank you for the opportunity of saying this, and I was very glad of the opportunity when you asked my people to come down. We have got some bright men on our force doing institute work, and they will be here at your service during the day and the evening; and I especially want some of you people to know what this man from across the line says about their fruit

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and how they are doing over there. Prof. Card has been telling the farmers just how to do this work for the last three weeks, he has an address that he delivers at our institute along this line and I presume it will afford him pleasure to talk with him on this matter. Mr. President, I thank you again for your kindness.

GRADING AND PACKING OF FRUIT.

[Conducted by the delegates of New England Horticultural Societies in attendance at the annual meeting.]

REPORT OF SPECIAL COMMITTEE ON GRADING, PACKING, AND BRANDING, WITH RECOMMENDATIONS FOR FUTURE ACTION.

Dr. G. M. TWITCHELL, Auburn, Maine.

At the session of this State Pomological Society November, 1905, after a full discussion of the subject of grading, packing, and branding fruit for market and the importance of action to secure official inspection and protect both grower and consumer, it was voted that,

"This Society, recognizing the substantial growth of our fruit industry and realizing the necessity for a more critical grading of the stock, for the protection of the grower, declares in favor of national legislation looking to a Fruit Marks Act, and authorizes the appointment of a committee whose duty it shall be to correspond with the officers of the Fruit Growers' Associations in the several states, and if a general sentiment is found favoring such action to arrange a conference for the purpose of outlining national legislation."

In the wisdom of the members it was decided to create a committee of one to whom the sole subject should be referred and the speaker was selected. No one at that time dreamed that within two years a conference of all the New England States upon this specific subject would be possible yet such was the interest manifested and so hearty the co-operation, that, in March, 1907, delegates were present from each of these states

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at the sessions of the Massachusetts Fruit Growers' Association at Worcester. This association freely set apart one session and to further the interest provided the leading speaker, Prof. Craig of New York. The result of the discussion was to intensify interest in the subject, while urging conservative action. The importance of more critical grading, packing and branding and of such legal enactments as will insure this was freely admitted, yet everyone felt that the one thing to do was to make haste slowly, to be certain that when legislation is attempted it will be such as will claim the earnest support of individual growers all over New England and insure lasting benefits. If there was fear of impulsive action on the part of any, it was dispelled at once and complete unanimity of sentiment characterized the deliberations of the entire session. The consciousness that this coming together of delegates from different societies had in it possibilities, far reaching in effect to our fruit interests, was apparent from the first and before the hour of closing the wish was expressed that these conferences might be continued. Sec. Knowlton grasping the situation cordially invited the societies represented to send delegates to this meeting of our State Pomological Society and the invitation was most heartily accepted.

I desire here to express my personal obligations to the officers of the Massachusetts Fruit Growers' Association for assistance in arranging for the first conference and for setting apart so much of their valuable time to its deliberations. Without this the work of your representative would necessarily have been greatly delayed.

As the consciousness of the possibilities resulting from yearly meeting together and discussing subjects vital to the interests of all has grown in my mind, the significance of the step inaugurated by this Society assumes larger proportions. Wisely fostered these gatherings may be made of great practical value to every man in New England who is turning his attention to fruit growing. While Maine produces the larger crop of apples each and every State is directly interested in the permanent success of the purpose of this conference, and while years may elapse before legislation is attempted these gatherings may be made the means of stimulating a deeper interest in fruit subjects all over New England in kindling enthusiasm for insight into the mysteries which envelope the industry in arousing

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ambition to master the difficulties and multiply the orchards, and in concentrating efforts to produce only the best fruit possible in each locality. The problems hinted at are so profound and far reaching that they may well claim our united effort and in the results obtained there will surely follow clearer vision touching the fundamental purpose at the conception of this conference. Well may we of Maine rejoice in this gathering of the students and workers of New England. Our welcome is cordial for our obligations are fully recognized. This Society is honored in this Conference of fruit interests and the industry in Maine must receive a decided impetus from the presence and counsels of these representative leaders from other States. This is indeed a happy hour for your representative who finds his most profound hopes realized in this coming together. It is for us devoted to the advance of the fruit industry in Maine to drink deep draughts of inspiration at this session and carry to our homes the valuable lessons these gentlemen will present for our consideration. We as a Society, have taken a step far reaching in its significance to New England fruit interests and it behooves us to set ourselves in line to realize all that is possible today, and in the future, as the result of this union of forces for specific results.

Asked by our Secretary to present recommendations for future work, my first will be one looking to a permanent organization of New England workers for the specific purpose of holding yearly conferences upon fruit and kindred topics; for the closer acquaintance of each others' methods and for the consideration of questions vital to the best progress of rural New England. Set off in a measure by ourselves it is peculiarly fortunate that we may thus unite and so wield an influence not possible for either State alone.

Time is presenting great questions for our thoughtful consideration. Rural conditions are changing rapidly and grave problems rise before the student of rural progress. The multiplicity of helps pouring in must be intelligently directed to the good of the greatest number or they will lead to a paucity of ideas upon subjects which must ever supply the mainspring of action in rural life. Before satisfactory results can follow legislation there must be public sentiment in its favor and the next step for the friend of the apple is to help create a demand

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for choicer fruit. That spirit of commercialism which is satisfied with present returns must yield to that which seeks only a permanent standing in the market. To insure this it must be established that the contents of every barrel are true to name and the brand of grade absolutely correct. The lack of uniformity among packers works injury to the industry. Responsibility for relief rests with the grower. Shipping over one million barrels this year Maine loses hundreds of thousands of dollars for want of this guarantee of uniformity in grading. The legal right to inspect would be an incentive to truer grading. The reputation for a uniform standard of grading, packing and branding would insure millions to New England growers in advance over present receipts. Education can do much but legislation alone can finally insure protection. That legislation must be either State or National. The union of the six New England States covering a law to be passed by the legislatures of these States is, in my mind, the step indicated and to arouse to the necessity and benefit of such legislation our present duty. This problem will never be settled until it is settled right and right includes the highest price possible for the grower and the absolute guarantee of straight grading, packing and branding to the consumer. To this we must bring the industry and agitation will accomplish the result.

Well will it be if we set ourselves to this task. Important and necessary are the lessons which centre in fertilization, selection of varieties, protection from myriad forms of insect pests, growing, picking, grading, storing and marekting fruit, but these are steps to one end and that end must also claim our thoughtful attention, else nothing permanent is likely to be gained.

The transcendant demand upon us is to promote rural progress by kindling desire in every man to know himself, his capabilities, and his limitations, that knowing these he may find the life which will be attuned to the diviner harmonies. Co-operation and brotherhood are the watch words of the hour but these may both be used as efficiently to foster vice as virtue, to work violence as to build the walls of honor about the citadel of the home. If the city is to be made safe the country must build the defences. If the standard of moral rectitude is to be advanced the conservative rural population must fix the princi-

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ples of honor, virtue and sobriety in the hearts and brains of the coming generation. Not alone good fruit and a well established reputation but better men and women must be the product of these gatherings else the spirit of commercialism will bury us under the crust of selfishness and greed. Looking to the future for the growth of our orchards the increase of product therein, the better price through improvement of the same and the certainty of justice in the market we must also be directing our gaze intently upon questions of civic righteousness that when the fruits of the harvest are gathered we may enjoy them in peace. Every agency set to the betterment of financial conditions is called to direct its critical attention upon questions of civic duties that the name of sentimentalism apparent everywhere which finds expression in indulgence, may give way to the restraining influence of love and the building of self centered, well poised characters. Shame be upon us if seeking so earnestly for quality in our fruit we neglect to toil as patiently for quality in life.

To build ourselves into full, free manhood is the true mission of all toil and he who conquers most may see most of what that life embraces. Devoted to a study of agriculture and pomology we must be conscious that there is imperative need of such reorganization of systems and methods as will inspire in the young the will to know more of natural things. The education of the past has been to make men cultured, that of the future must be to make them efficient. Efficiency is the cry everywhere coming up from every mill and factory, from every farm and shop, and this can never be gained until the gray matter of the brain has been trained to see, the heart to feel and know and the hands to do. Machines can do much but back of these there must be thinkers and they come only as they reach after the knowledge of constructive work. The past has had to do with the heads, the present and future must recognize the hands and the hearts. Combinations of labor and capital, conditions underlying manufacturing and the unduly fostered desire to become a wage earner without training have closed the door to all opportunity for learning a trade and so mastering an industry. If we would build a self centered citizenship throughout rural New England more attention must be given the steps leading thereto by those who recognize the value of industrial train-

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ing. Our civilization must rest upon the intelligence of the rural population and that must be gauged by the ability to think promptly, consecutively and understandingly. The whole problem centers in education and therefore it behooves us as devoted friends of rural life to unite our forces for such study of the problems of rural progress as will most rapidly develop knowledge of the industry and the duties and obligations of citizenship. While we consider details let us not forget to reach out after larger control of all questions centering in rural life that the results of our combined efforts may promote zeal, interest, enthusiasm, and desire for industrial vocations certain that this will lead to a safer, more stable, more patriotic American citizenship. The time is ripe for us to organize and concentrate upon subjects facing not only the orchards and fields but the homes and streets of every country town and village. Interwoven are these problems and not to be separated without danger to each.

There are great possibilities for New England fruit growers. They far surpass our widest conceptions. There is wealth in all these hillsides and we, or those who come after us, may pluck it from the trees, but these possibilities will come to you and me only as we reach after the full measure of well balanced manhood and womanhood, alive to the call of the trees and also the call of the street, never forgetting that life only is secure where moral rectitude and civic righteousness are reflected in the lives of the men and women of the community.

Away down on Cape Cod there is a high, steel tower with wires running from the ground converging to a common centre. Did you ever toss a pebble into a pond and try to follow the first ripple as it extended farther and farther its circle until the whole lake had been reached? So goes the message flashed out from those wires on that tower and if three thousand miles away a receiving instrument is attuned to the same vibrations, it will take and record the story whispered across the Atlantic over silent waves of air. Only a Marconi could have dreamed of such power but it was there and had been since the day when first the morning stars sang together. So, all about us, over our heads, under our feet, in our orchards and among our

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animals are hidden possibilities to be uncovered and utilized by man for man. Only he who knows best the story Mother Earth would tell can unlock its hidden treasures, only he who best knows himself can measure the heights towards the Infinite. Only he who has been trained in hand and head and heart can fathom the depths and make plain the path for others to walk to greater success.

WILFRID WHEELER, Concord, Mass., Chairman Committee on Fruits, Massachusetts Horticultural Society.

It gives me a great deal of pleasure to be down here at one of these meetings of the Society which is doing so much for the promotion of horticulture in New England, and I feel especially honored at this time to be able to represent a society in Massachusetts which is working along similar lines. We are striving to bring forth the quality of not only fruit, but vegetables and flowers in the State, where that industry has been more or less neglected in the last twenty-five years. It seems to me that the possibilities for fruit growing in Maine are not confined to the apple but that the subject of small fruits ought to be more prominently brought forth in a community of this sort. You have a wonderful state here for the growing of all kinds of fruits—not only the apple which is discussed at length here and seems to be the prominent topic of this Convention, but for small fruits, that ought to be grown on your farms, and ought to be distributed throughout your cities and through your rural communities to a greater extent. Principal among these is the strawberry which is by far the leading small fruit in this country. It is a fruit that lends itself to any climate, to any situation, to almost any soil, and it is a fruit that can be shipped great distances; it can be used at home, it can be used in preserving, and in many other ways, and it seems to me that the Maine farmers and the Maine horticulturists ought to consider this question very seriously. The growing of small fruits is practically a simple matter if taken up systematically. A strawberry can be planted in one year and a liberal crop reaped the next, which you cannot do with apples or any of the tree fruits. And it can be grown among your orchards. For

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instance, if you are starting an apple orchard this year, plant three or four rows of strawberries between and keep the ground worked up well. In that way you will get a return from your land long before your apples will be in condition to pick. Then again, a point that I want you to consider well is the matter of shipping strawberries south. You can grow strawberries at least two or three weeks later than we can in Boston. Here is Nova Scotia shipping thousands of crates to Boston after our fruit is gone and realizing prices that we never can get from our own native fruit. Why can't Maine do this same thing? Here is a country north of us that ought to grow the finest kind of strawberries and ship them down to Boston and the Massachusetts cities and realize a profit from them far greater than you can from dairying, potato raising or any of those other hard labor occupations. That is a question that Maine ought to consider well. I know you are up against the problem of labor for picking that crop; but if you were to take it in time, plant and take care of your bed so you will produce only good fruit, the question is very small, and you can ship those berries and get them into the market in Boston a great deal quicker than they do from the South, which takes anywhere from forty-eight to sixty hours to get varieties from Norfolk, Va., into the Boston market. You can get varieties from Maine into the Boston markets in twelve hours and they will wholesale anywhere from fifteen to twenty cents a quart. It seems to me that point ought to be strongly brought out, and some of this land that is now lying idle, or being more or less farmed, would produce that strawberry crop and supply our markets.

Currants, gooseberries and those other small fruits can also be grown in this country just as well. The idea of using currants is becoming more strong in our cities every year. They are being used largely for preserving, I think, jelly making. It seems to me an industry of that sort should be worked up on the farms. I just happened to look in your report of last year and I saw recommendations of home work for women on the farm, among them jelly making and all that sort of thing. Right here the small fruit comes in and fills a place that nothing else can. I feel that the small fruit question is hardly known here in New England as yet. We produce strawberries around Boston by the acre in great quantities but we over-supply the

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market and we have to ship sometimes into Maine and into New Hampshire and into Vermont. But, at the same time, the market is not used in the right way. We are apt to ship into a market at short notice and get the varieties in there and there is a glut in the market perhaps—no way of storing the way there is for apples. So the market has got to be studied from a great many points, and it can be looked into carefully by the Maine growers. I think they will find that they have got a fine opportunity for growing these small fruits and shipping them south after our crops are gone.

Then this question of co-operation among societies—I feel that this is going to be one of the greatest outcomes of these meetings: We are going to get together and give each other ideas along lines that we can all work together on, and we are going to get mutual benefit from these meetings. Among other things, there is one thing that we want to consider well, and that is keeping the young men home on the farms. You know the rural communities supply the cities with all the mechanics, clerks, and all the young men that practically work the machinery of a large city, and the farms of New England are suffering on that account. We are running our farms largely with old men, the last generation. The younger people are not true to the farms, or if they are they don't go out and study methods. I know the agricultural colleges are doing a great deal of good in that line, but at the same time if that isn't tried at home you never get the benefit from it that the agricultural colleges should give. That is a point we all want to get together on and devise means of keeping the young men at home on the farm. The most important asset that a New England farm can have is a son growing up ready to take his father's business and carry it on. Farming, agriculture and horticulture in New England should be treated as a business and have business methods applied to it the same as any business in a large city is run. And I believe that a larger per cent. of money and a larger per cent. of health can be gained from the New England farm than from any other business or occupation that this country knows at present.

And a word on the apples, while I am speaking of the horticultural interests of New England. What we want particularly in our large cities is not so much quantity—we are getting

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quantity, we are going to get quantity, and we are going to get it in abundance from the West in the next ten years, we are going to be filled with apples from the Western States, apples of very questionable quality,—good in appearance, look fine, sell well, but when the buyers come along and know that they can get good apples and get quality in New England, I believe they are going to stick to New England. At present we are buying in Boston apples such as Jonathan, Ben Davis and that sort of apple, which looks well, appears well on the table—certainly a fine apple to make up a center piece on a dinner table or anything of that sort, but they have not the quality. Now we can grow in New England apples, and grow them within a few miles of the large cities, apples that have got quality, and they have got the appearance, and that is what we want to keep at in New England here. We want to grow quality. Of course there are chances to grow at the same time a quantity of other fruit that we can ship greater distances, but another thing is we want to grow more early apples. Here is a market in Boston for early apples. Williams were selling in the Boston market this year for three to four dollars a barrel, other apples in proportion, whereas later apples never would bring those large prices when grown in New England. I believe the reason why early apples have been neglected in New England is because we can't grow them, and haven't grown them fancy. We have got to spray, we have got to prune; this matter of spraying has got to be brought out more forcibly here in Maine than anywhere else. You are going to have all the gypsy moths, brown-tails, scales and everything else we have in Massachusetts, and you will find the sooner you begin to spray and take care of your orchards the better profit they will pay you. Spraying may seem a lot of work, but it has got to come. All the big orchardists in the West, South and Middle States spray just as systematically as they are picked, and they are pruned and thinned just as systematically. And we have got to spray our small fruits just the same, strawberries, currants and gooseberries, just the same as we would larger fruits. And those methods applied here in New England will increase our profits and our quality. What we want to look after is quality and not quantity, so that New England will get a name for quality unsurpassed in the country. I have here a few apples that I bought, grown in

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Massachusetts. And chief among them I want to show you an apple here—of course you all know it—the McIntosh—which attains in Massachusetts with good care, spraying and thinning, a remarkable size and will sell in our markets at home from the first of October, or the 10th about they begin to come in the market, from the 10th on until this time they will sell at $4 a barrel. That apple, I believe is the highest type of quality that is grown in this country. It cannot be shipped to England, or from California or Oregon to Boston or New York. But it can be grown here in New England and it can be grown by spraying and thinning and pruning, without a bit of scab, just as clean as that apple. I have seen hundreds of bushels grown in the orchard this came from, and not an apple with a scab on it, and it is done by spraying, thinning and pruning. You can't let the tree overgrow, you can't let the tree overbear in order to get a quality like that.

Then again here in New England is a great chance, particularly around Boston and the southern part of Maine and New Hampshire,—I think there is a great chance in pear culture today. There are pear orchards that were planted at the time of Marshall P. Wilder and those old horticulturists. But there is hardly a pear orchard round Boston that is worthy the name today. The pears in the Boston market either come from Delaware or some of the Southern states and are generally the Keifer pear, which is miserable in quality, only fit for preserving. But today I believe Massachusetts and certain parts of Maine, particularly along the seacoast, southern New Hampshire and Rhode Island and possibly in Connecticut, that pear growing can be made one of the most profitable industries that we know of as yet. And this variety of pear [showing pear] can be grown in localities where no other pear will grow—that is, a russet coat will grow where a thin skinned Bartlett pear, or the type of the Bartlett, will be sure to spot even with the best spraying. This is the Beurre Bosc pear, and attains the usual size in the immediate vicinity of Boston. Those pears this year, in that size, were put into cold storage by the buyers, and they are oftentimes sold as Western pears, as they have a name in New York and Boston as being the only pears that are sold that have the quality. But this pear grown right here in Massachusetts has the quality and the flavor of the best pears that are

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grown in this country. I don't think there is any section outside of Boston that can equal it.

The question of spraying ought to be more prominently brought up here at this time, I think, and more forcibly impressed on you than I can do it. But at the same time I think you are alive to the ravages, to the danger from the ravages of the gypsy moth and the scale and from the brown-tail moth. We in Massachusetts have had a test of that and it has cost us heavily. The legislature has appropriated something like $500,000 to be used this coming year for the suppression of the gypsy and brown-tail moth. I hope you will never have to come to that because it is certain to cost you dear in the end, even if you only keep it in suppression for a while. It is one of those things that is sure in the end, I think, to adjust itself. There are parasites being introduced into the country which are sure to find their level, and the parasite working on the gypsy moth and the brown-tail will be sure to keep it in check. But in the mean time we cannot let our orchards and our forests and our other trees go, so we are expending this immense amount of money to keep it in partial suppression so that it won't spread to the other states. The government has taken some interest in the matter and has given us an appropriation, and it is to keep that pest confined in Massachusetts where it is at present that the government is striving to do. But we have to keep up a large appropriation in order to get the government money to carry on the work. I hope you won't get the gypsy moth. The brown-tail isn't so bad. I think the gypsy is not as bad as the scale in a fruit orchard, and you are bound to get that more or less, trees bought from nurseries, bound to get in even if you think the trees haven't the scale or are fumigated before they come.

The question of the growing of quality in apples I think ought to interest us a great deal. I have here an apple grown in Massachusetts, to some extent following the Granvenstein, called the Bay State apple. I don't know whether it would do well in Maine but it is a very pretty apple as grown in Massachusetts. It is of about the same quality as the Gravenstein, comes in a little later, just at the time before the McIntosh is ripe. It is considered one of our best table apples in Massachusetts. I don't know as it would ever become popular in

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Maine. I don't know enough about the hardiness of the tree here; but in Massachusetts it is very hardy, it stands well, and is going to be planted more extensively. Many orchards are being grafted to it, in the western part of the state particularly.

The question of small fruits ought to occupy more of this convention; I believe that the subject has been very lightly touched upon by these conferences as a rule. We in Massachusetts of course are interested in it largely from a commercial point, but I think the householders ought to be interested in it more. You ought to interest people who own a small amount of ground in the growing of these fruits. You can grow all kinds in a small amount of ground if you only have the ideas of general management in mind. You can take strawberries, raspberries, blackberries, currants and gooseberries and grow them in connection with your larger fruit orchards, in a small garden. And it is near the large cities that people ought to be interested in this work of growing their own fruit gardens. You can get a variety in your own home garden on the farm that will give you fruit from June until the following June. In that way you increase your life, you increase the pleasures of country life. I want to quote a little passage from one of the ex-presidents of our Horticultural Society, who said at one of our meetings: "Plant for the people of the distant cities; plant for future generations; plant for yourselves; so that all may enjoy earth's great blessing without stint or measure." Thank you for your attention.

Prof. Hitchings. Just a word in reply to one article in the paper just presented. I want the brother from Massachusetts to know that Maine appreciates small fruit culture and that there is being some of it done in the State, especially along the strawberry line. And if the apple is the king of our fruit, the strawberry is surely the queen. We have men in the State producing or cultivating anywhere from two to six acres of strawberries and those men are getting a yield of from eight to thirteen thousand quarts on the acre of the best berries ever raised, a better quality than we can raise in Massachusetts, and the net price in Boston markets is between ten and eleven cents a quart, the average yield being about 8,000 quarts to the acre. So you can figure the profit in strawberry raising in Maine.

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Mr. Wheeler. Isn't that done mostly near Portland, or south?

Prof. Hitchings. We have them as far east as Hancock, over almost to Washington county.

Mr. Wheeler. It was my intention to apply my remarks more to the northern part of the State, growing them later and shipping them south to us. Your berries in the southern part of the State are good but come in conflict with our Massachusetts berries, therefore flooding the market at a time when the prices are low and the quality of the berries in coming that distance might not be able to compete with the nearby strawberries. I had more the idea of bringing the matter home to the northern part of the State where you would be able to reach Boston within fifteen hours of shipment possibly, and then being later would be able to supply the market after our own fruit was gone.

JOHN W. CLARK, North Hadley, Mass., representing Massachusetts Fruit Growers' Association.

I am glad to be here to represent the fruit growers of Massachusetts, and as I understand it the question before this meeting, before the delegates from the different societies is in regard to a national law being passed to control the packing and grading of our fruits, the apple especially, and to get the views of the different organizations.

Now the importance of this question no one disputes. How it shall be done, and when it shall be done, may be a question. But it is an important question, and whenever anything is done about it, I think we should carefully consider what we are doing because it is easier to go slow, you will get there quicker to go slow and not do a thing that you will wish you had not done and have to take it back.

Now this is a very important question. The origin of this, I suppose, is the Canadian Fruit Marks Act. That as I understand it, I am sorry that I cannot give you all the details, and if any one here knows just what the act is I wish they would correct me, because I would like to know exactly—provides that a No. 1 Baldwin (I take the Baldwin for that is our chief apple) shall be not less than two and one-half inches in diameter and free from defects. If apples different from that are put into a barrel marked "No. 1 Baldwins" inspectors are appointed to

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inspect each and every barrel, if they see fit, and where they see it comes below that standard to condemn it. Now let me ask you one question. Does Maine today want to grade their No. 1 Baldwin apples two and one-half inches, free from defects? If so, what proportion of your apples will be No. 1? I don't believe one-third of them would be this year. Now are you willing that a law should be passed that says you shall not put in a barrel of apples an apple less than two and one-half inches in diameter and free from defects and send it to market as a good apple? I am afraid when you think it over carefully you will say "Go slow." Now I don't think—and I speak from the point of a man who makes his living growing fruit—I am not here simply to talk theory—it is what affects my pocket, and it is my fruit that fills my pocket if I get anything in it, and it is for my interest to fill it as full as I can. Now you take this year, the dry weather and the heavy crops have made your apples small, under size. Now in grading my apples my rule is this, grade my apples according to their general style, of the whole crop,—if my apples run large throughout, to make them run large; if they run medium, to make them medium grade, and if they run small to put in smaller apples than I would if they were medium or large, provided that apple is perfect. Because I would rather have in a barrel of No. 1 apples an apple two inches in diameter that is perfect, well colored, not wormy, not a defect on it, but a smooth, solid, bright colored apple, perfect in form and free from defects,—I would rather have that than an apple three inches through that is wormy or has hard knots in it. It will give better satisfaction. And if your apples run even, they won't find fault with them either, if there are more or less of this smaller grade; but make them run even and not put the large ones at the face end and the little ones at the bottom. Of course when you face a barrel of apples you face them up with the best you have; but don't put any more. Just face them up with good nice apples and put in a few just one layer below the face and then fill your barrel up just as the apples run from the face end to the top, or the bottom, whichever that may be, and mark them, if it is a No. 1 grade mark them a No. 1 grade, and when they open that barrel they see just what they are. Now I wouldn't want to have a law enacted that

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would tell me that I shouldn't put on the market only such and such apples. It don't go down. It don't fit. It wouldn't with me anyway.

Now I would rather see this done, I would rather see a law enacted that a man should put his name on every package of apples that he puts on the market, the name of that variety, its grade, and the place where he lives; then send it to the market, and when they open that barrel, if a man buys it and finds it isn't what it is labeled, the grade it is said to be, if he goes to market the next day and sees that same man's name there he will examine that barrel of apples to see if it is like the other, and if he gets bit more than once, you may rest assured that he will be careful not to get bit the third time. In that way we will help the grading of apples. Now before any such law could be enacted, we have got to begin at the bottom and that is, grow better fruit. Now we like to have people pat us on the back and tell what nice things we have, what nice fruit we grow, and that we can do better here than anywhere else in this great land, but is that the way to do? That don't improve us one bit. When we stay at home and look at ourselves, we think we are somebody. When we go away and mix with other people, we don't know where we are—we are not half as big as when we were at home; and so with our fruits. We have got to begin at the bottom and grow better fruit, for we don't grow our fruits in Massachusetts, we don't grow apples in Massachusetts, and I think a majority of you here in Maine don't grow apples. What do you do to grow them? Set out the trees, gather the fruit,—that is about all. Now before we are ready for any such legislation as is asked for, we have got to grow better fruit. And then, why if we grow better fruit, and only good fruit, why what use is there for this legislation? You are smart enough to look out for your own interests, and I try to be to look out for mine and to do what is going to give me the best returns. Now these Western apples—they bring up instances of the Oregon fruit, the Washington fruit, the prices they get—yes, they do get big prices, but mark this—are you willing to grade your apples the same as they do? Their rule is that no apple shall go into a box that has any defect at all,—even if while picking the stem is pulled out that apple is not packed in that

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box. Do you throw away every apple, and not call it a first-class apple, large and nice apple with no defect about it except the stem has been pulled out? You have got to grade your apples a great deal better than you ever did yet, I am afraid, if you are going to bring yourself down to what you say other people are doing and getting the best prices. So that I say again at the foundation, the growers must grow better fruit, handle their fruit better, and as they do they will for their own defense put their fruit up well and send it to market and get good prices.

Now a commission merchant was saying to me the other day that there ought to be a law passed forbidding anything less than two inches in diameter to be shipped to market as a No. 2. I said, "You don't know what you are talking about." Says I, "It is all right for your side, but it is not all right for the side of the grower. It would be a very nice thing for you to have nothing but nice fruit coming here to market, but we that grow it have got to pay our bills, and we have got to be careful that we get out of our fruit all that there is in it." Now take the No. 2 apples, take one case, for instance. I try to get out of my No. 2 apples enough to pay me for handling my crop and doing a larger portion of the work so that the No. 1 apples belong to me after paying my bills. Now you see No. 2 apples don't bring much. Now I will say this that last year, and I think this year will be no worse than last year, my No. 2 apples sold for $2.25 in Boston a barrel. Why, that wasn't a bad price for No. 2 apples. We sold them in January and February. If you put your apples onto the market now, you won't get much of anything for them after paying expenses, that is, your No. 2 apples, after paying expenses, the cost of barrels, commission and railroad cost. Everybody is shipping their soft fruit that is not going to keep, to stand up any length of time, into market now or they won't get anything for it. Now if you can arrange it so that you can hold back that fruit until the market is cleared, there is demand for such fruit. Not every one in the cities can buy a barrel of apples—of nice choice apples, or a bushel of nice choice apples; they won't do it. But there is a large number there that will buy a cheaper grade of fruit when they wouldn't buy any fruit at all if it wasn't for this cheaper grade. And as long as there is a call for this cheaper grade of fruit, put it up for what it is, send it to market

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for what it is, and let it be sold for what it is. No one is cheated. If you should put your fruit up as No. 1 and sell it as No. 1, with a peck of No. 1 fruit at the face end and the rest poor, why then of course there would be deception; but if you put it up honestly it will sell honestly and it is an honest trade all the way through. You are benefited and the buyer is benefited. I know that it is important that we send good fruit to market. It is for our own interest to, but I don't want to see a law enacted that tells me I shall do this and I shan't do that. It goes against me, and I know it does you too. My disposition is not so much different from what the rest of you have. I would like, as I said before, to see a law enacted, and that would harm no one, that every man shall put his name on his barrel, the grade of fruit it is, the name of the fruit and the place that he lives. That, I think, is all that is necessary to do today. By and by, if you want to do more, when you get up to this and grow your fruit good enough,—that is the time I think to bring the question of legislation, to have restrictions put on the packing and grading of fruit, and not now.

Now this is about all I have to say on this line, and I know in speaking on this question—I am satisfied at least—that I speak just about the same as all our practical fruit growers, for it was brought up at our meeting last year, and I think it was when your representative was there and spoke in regard to it, and one or two just touched on it after he spoke of it, and then I got up and I told just what I thought as near as I could, and I said—I used our friend, Dr. Twitchell's, own story, I stole a little of his thunder, I said I thought we were just about in the same position that the little boy was when the minister asked all that wanted to go to heaven to raise their hands, and all but one raised their hands, and he turned to him: "Johnnie, don't you want to go to heaven?" "Not yet." And so I think in regard to this law, it is simply "not yet." Thanking you for your time and attention.

T. L. KINNEY, South Hero, Vermont, President of Vermont Horticultural Society.

I shall have surely to differ from my brother on this matter of going slow. I never met an audience in New England yet

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where I felt at liberty to say "Go slow." We must put out more energy and go faster. How do any of us expect, even farmers, to ride in an automobile if we don't go fast. Now the only question is, to keep your balance when you turn the corners. But you have got to go fast, and the apple growers of New England have got to stir and move quickly. We have got to grow up apple trees that will bear fruit in less years; a few years ago we thought it took twelve or fourteen. The day has gone by when slow action is asked for in New England. We have got to move quickly and this matter of the Fruit Marks Act of Canada is something that we want to consider today and with a great deal of vigor and determination and energy. Now we have learned how to grow good fruit, as these tables exhibit to you. We have learned how to put it on the table in the condition that it will show well, and we never any of us think of such a thing as bringing our fruit here and exhibiting it in a poor condition, with good apples in the top of the box, and poor ones in the middle when we ship them to market, as our brother has said. Now an apple that comes to market and sells for No. 1 is to be two and one-half inches in diameter. Now don't think that you are to be frightened, or scared, if you have sold a barrel of apples according to the Marks Act of Canada and there is one poor apple found in it you are going to be taken up and sent to jail or prison for it. There is a provision there, as there is in every law, a provision in that Marks Act that says that if there is more than a certain amount of apples in that package that don't come up to the standard then they will be called to account. They are liberal. A very liberal amount is allowed by the law. And officers are provided, inspectors, to take that matter into consideration, and they are not allowed to take up a man because of a few apples found in a barrel of good apples. But the law is that we shall protect ourselves and our customers by putting up just what we have marked to be put up.

Now what is the condition of things in New England today? I know it is in Vermont, and I feel quite sure it is in Massachusetts, New Hampshire and Maine, where apples are grown, there are a great many farmers that won't risk their apples, to sort a barrel of apples today. Why, there is nothing to govern that package, govern the sorting of that package after it gets

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to market—nothing to govern it—and how does he know, what has he got to tell him what is a No. 1, what is a No. 2? There isn't half the apple growers in Vermont that know that two and one-half inches is required by the commercial societies of the country for a No. 1 apple, that two inches in diameter is required for a No. 2 apple. Now what they want to know is to know just what a No. 1 apple is. Why, it is a sound, perfect apple, two and one-half inches in diameter or more. Now is any one fearful of putting up a box or barrel of apples with those conditions? No, just as quick as they know that to be a fact. Then if a quart, or peck, or whatever the law states, is found—then you are convicted, not otherwise.

Now the Marks Act requires that those inspectors watch carefully the producers. They are working for the producer as much as they are for the consumer. They are to watch them carefully and if they think there is an inclination for fraud on the part of the farmer or speculator who is buying the apples and shipping them, then go for them strong. That is the way with us Yankees here in New England, we want the law first to act upon, and then we are going to use good judgment in the action of that law.

Now we want that law just as quick as we can get it. Don't go slow. Don't wait. We want to consider that today. Isn't it sensible, isn't it right, that any product which we may produce in the form of apples, the standard fruit of New England, should have a standard by law which makes it entitled to its position on the market or anywhere else? Isn't it entitled to it? Then if it is entitled to it, give it the benefit of your legislation. Give it the benefit of your Government legislation. If the Government doesn't legislate to this effect, some of the states are going to at the next session of their legislatures. We almost had such a legislation in the State of Vermont nearly two years ago. The bill almost went through, and I am sorry it didn't. It was just that slow condition of our old New England farmers at just the last minute. We don't want any more of that slow action. That bill should have passed two years ago and we should have had two years' experience today to show to the people of Maine what the conditions were after trial. What is the use of waiting for an automobile if you have got the money to buy it and you want to ride fast? Now is the time

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to do it before it is out of fashion. It is just so in this legislation business. Remember that it is the people here at home, it is the fruit growers in this assembly here that are going to push this matter up or down; we are going to be energetic or we are going to be slow, and we are going to make that law if anybody does. The politicians in this country are not going to make that law unless they are driven to it by the people who are interested in apples.

Now we want to consider just a little more the very conditions which we are laboring under today as a commercial growing center of the best late keeping winter apples there are in the world. You may talk about the Pacific coast—there is no place on the face of the earth—perhaps the Canadian provinces can grow as good a winter apple as we can, but no better, they have got their markets for theirs, they are going across the water and into the Northwest—we have got these great markets to fill here in the United States. I don't care if we never ship another barrel to Europe, we can consume them all here. What we want to do is to put these apples on the market in a condition that they will bring the best price and that nobody will be afraid to buy them.

Now the matter was brought up here by the Massachusetts gentleman the other day about those poor apples in Vermont, and those poor apples found here in your little town. Now I don't think it is any disgrace that those poor apples were found out here in this store. There may be some persons so poor that they feel that they can't afford to pay more than ten cents for that package of apples—and it wasn't a big price for them. I don't care if they were too poor to peel,—they could be eaten without peeling by some poor child who hadn't money enough to buy anything better. Now then, the Marks Law in Canada and the one we are going to have in the United States, isn't going to forbid us from sending our poor apples to market at all. When you consider as the gentleman has considered, the No. 2 is worth more money to the person who wants just actual worth in those apples than the No. 1. Why? Because the No. 1's are very large apples, many of them much larger than two and one-half inches in diameter, and there isn't so much weight as in the small grade of apples. You don't expect you are going to get an apple more than two inches in diameter—or not

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MAINE FARMER PRESS, AUGUSTA

T. L. Kinney (on the right) and his apple pickers, South Hero, Vt.

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many of them, for No. 2; but they are going way above two and one-half, many of them, in a barrel of Northern Spies such as are shown here. In a No. 2 barrel they will be restricted down to about two inches. You may put larger ones in, but what would be the use when they can go into the No. 1? Now then, that No. 2 barrel and a No. 1 don't amount to much this year—I should prefer this year in putting up my stock to have all No. 2—I should prefer in sending my apples to Boston this winter, and I have got seventeen hundred barrels, not to send one No. 1 barrel if I could have a law that would protect me on No. 2. But what does the market think of No. 2s? Why, they think a No. 2 is no good at all—they don't know whether they are getting an apple or slops. It is a jockey package, that is the way they consider it on the market. They don't care what you send them as an apple grower if you will only let them know just what is in that barrel. If it is slush in the middle or isn't very good, he has got a place to trade that off, there are lots of people that look for that kind of goods. Now if we had an act saying that No. 1s shall be such and such, No. 2s shall be such and such, to accommodate the condition of our apples today, I would prefer all my apples should be put up as No. 2s—I could face them so nicely and they would look so nicely, no one would consider them under the head of No. 2. When he speaks about the man's name being placed on the apples,—the man's name has got to be placed under the Marks Act in Canada, and the grader, or both—or the owner or both—so that they can trace them right back. It don't matter whether they find that apple in Montreal or across the water or somewhere else, they can trace it right back. Your apples have got to be marked just the same by this Marks Act as the gentleman asked you to have them marked. But what do we care about our name specially, if we have this grade mark? That makes all clear. We have got as good apples in Maine as in Vermont, and just as good in Vermont as in Maine. The question today is the packing, the grading, the marking and the shipping. We are working today to this combination, this gathering together of representatives from other societies and we know it is going to help our societies to be heard and go back and report what we see here and learn here, and we hope it will

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be some gain to you. Now when we get together, so that we can work in combination and on equal terms all over this great country of ours, how much better it will be for the whole of us. How much better it will be for the smallest apple towns here in Maine. Now the buyers, do you know what they are doing? Some years they come and they want the largest apple, they won't touch a No. 2. A year ago they wouldn't buy No. 2 Russet, Bellflower, Talman Sweet, wouldn't have them. They would take No. 2 if we gave them No. 1 to have them. Look at the schemes of these commercial men. You know that corporations are sometimes said to have no souls. That means a good deal; that means more than just a soul, sometimes, doing all their business through an agent. They have an agent in the office in New York, wherever the association is located; he does all the fighting. They have another one to go about the country and find out what the supply is and what the demand is going to be; they have another agent to go into the community and see what they can do with the farmer, and they beat you down and down and down until they get them as low as they can, and then they will make their purchase. Now then when apples are plenty and they have got a good market for winter apples, in order to make good sales and good returns they are not going to put any slush in the middle of the barrels that year. They won't take the No. 2s. This year they want everything they can get and they are putting everything into the middle of the barrel.

Now where is my reputation? My reputation is at stake in the hands of these speculators in New York who care no more for Maine orchards than they do for any other people anywhere else. Now give us this legislation. Give it to us now. If you can get the thing going any quicker or any better by starting it in your Maine legislature, commence here and work out into the National legislation. If you can do better to go right to the National legislature, go right off. The dairymen have a law to protect their butter, and it is worth more today than ever before. We want to protect the apple just the same. I don't know but the day will come when we will protect our orchards from insects and pests of every kind through legislation. I may have a neighbor who won't care much about the good condition of the orchards for the next few years and he

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lets the insects go where they are a mind to. Legislation is something we need along every line of business transaction, whether it is in commercial lines, whether it is insurance offices, banking institutions, trust companies, or on the farm—the law is what stands and the law is what we are going to stand by, and let us make these laws when they are needed and make them just as well as we can. Don't go slow. Study up these laws, read the Fruit Marks Act, and read the considerations of the societies along these lines in other states. Look at the State of Oregon. Just a few years ago Oregon, when they first commenced to produce those beautiful apples that are almost beating the world today—some other sections are keeping up with them,—their apples were all bought by men in California, rich corporations. They marked those packages California fruit and they went out to the world as the finest fruit that ever was grown. California can't today, and never could, grow so fine an apple as they did in Oregon. Pretty soon Oregon found it out. What did they do? Did they go slow? The people, the fruit growers of Oregon, got together and they called upon the legislature to pass a law that every package of apples that went out of Oregon should be labeled "Oregon Fruit." Simple law. Plain law. No use going slow about that. Grown in Oregon, let it be marked "Oregon." Don't let California carry off the honors for this fine fruit. And after that California people went down to buy the fruit and they had to sell it as Oregon fruit, and Oregon stands high in the estimation of the world today. And we in New England by proper legislation, and proper agitation, and proper work, and prompt work, and quick work, may bring our standard as high as Oregon or any other State in the United States. Thank you.

Sec. Knowlton. Considerable has been said here in regard to the Fruit Marks Act, and I think with many of us it is not quite understood what that act has accomplished and is accomplishing in the Dominion of Canada. Now a gentleman from Ontario is here and he can give us some idea, I think, of what that law has done in the Dominion of Canada. Only a few years ago, before this law went into effect, Maine fruit rated in the English market higher than the Canadian fruit. At that time as a rule I think the Maine fruit was put up better than the Canadian fruit. They went to work and passed this Fruit

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Marks Act, and, through its influence I think, the situation has been changed. Canadian apples are worth more there than Maine fruit. And I want these people to hear from Mr. Elliott of Ontario in regard to the operation of that law in Canada.

Mr. Elliott. When I look over this large assembly of fruit growers through the State of Maine and think of some other assemblages of people of Canada, my own Province, fruit growers also, I am somewhat in the position of a certain hotel man when he was entertaining a large number of members of the legislature in a legislative town. He thought that they were getting just a little mixed in the corridors of his hotel and he put up a notice reading something like this "The members of the legislature will come in to their meals first and the gentlemen afterwards." Well, he thought that hardly conveyed the right idea and he put another below it. "N. B. Loafers and blackguards are not allowed in the corridors of this hotel mingling with the members of the legislature because it is hard to tell the one from the other." I can hardly realize that I am across that imaginary line and on that side of it where the stars and stripes rule supreme. There is no emblem in this hall that tells me I am in the United States. I want to tell you that if you were in the city of Toronto, if there was only one solitary representative from across the border—what would we do? Why, we would have the flag of Great Britain that for a thousand years has braved the battle and the breeze, and we would have the American flag, both draped together, emblematical of the manner in which all this ought to be. The two flags together—what could they not accomplish? They could make war, but they would not make war. They could command peace, and the golden wings of peace would descend upon the earth. Those two flags together—what do they represent? They represent alike the liberty of the subject; they represent alike that great principle that every man is entitled to happiness as long as in the pursuit of happiness he does not infringe upon any one else's happiness; they represent education; they represent civilization; they represent civil and religious liberty. And this they represent, and will continue to represent, as thus they are draped together.

I am sorry that I am not a fruit grower to any great extent, and I am more sorry that the Canada Fruits Act, that I have carried

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in my grip ever since that grip was sent to me, was left at home only a few weeks ago. I am not going to give you what I say as being absolute authority. In some respects it may be wrong. I want to say, however, that to quite an extent, I disagree with some of the men who have spoken. I am speaking, you understand, from across the line; while we have a fairly good local trade, we have come to depend upon a foreign market for our trade. And what of the conditions of that market? I don't need to tell you that the Englishman is the most conservative man in the world. He wants exactly what he does want, and he doesn't want you to dictate to him what he does want; and he is willing to pay and pay liberally for what he gets. And if you don't offer him what he wants and don't cater to his prejudices, you are not going to deal with him. An illustration of that we have in the great bacon industry. The Englishman says, I want none of that pure white outside skin on the bacon and the shoulder and the ham, and we went to work and singed it just to cater to them. It didn't make a snap of difference as far as the quality was concerned. We must do that in everything that we send them. I have understood since I came here that the State of Maine has sent and is pouring in about a million of barrels of apples more or less per year, and the question in my mind is—Where do they come from? I haven't the slightest doubt that they competed with the Canadian in the British market, and here is, I believe, where legislation has stepped in. The question has been brought forward that every man should put his name on the package. This ought to be. But bear this in mind, that tens of thousands of barrels of apples are sold across the water, where it is a national mark that sells the article, and it is only as the national reputation is good that that fruit sells. You go to London, Liverpool, Glasgow, and you will see thousands of barrels rolled off those vessels. The man who buys them pays no attention to who grows them, but if they are sent out as Maine apples, and if that word on those packages means that they are exactly as they are represented, then those apples will sell by the ten thousand barrels. If five out of every six of the men shipping from this State ship a first-class, nicely put up article, but the sixth man does not, and his barrel drops into the hands of a large retail dealer, a man

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perhaps selling one hundred thousand barrels a week, that barrel is not as represented to be,—it is not the man who is blamed but the whole State of Maine suffers. We want some inspection by which the dishonest man shall be compelled to put up an honest product, in order to protect the five-sixths or nine-tenths of the people, as it may be, who are honest. That is the reason why I want some inspection, and I don't believe you can have it too rigorous in order to establish a reputation. Reputation is essential in the business world. Without it we cannot do business. We have got to trust to every man. We ought to have a rigorous inspection as regards the smaller package. This year, for instance, living within about four miles of a manufacturing town of some eight or nine thousand inhabitants, we happened to have a certain number of barrels of Snows, very nice; we were offered $2.50 a barrel for them but thought we could do better. They were put up in baskets and sold readily for from 60 to 75 cents a basket. We are looking more at the quality than the quantity. Do you suppose that the manufacturers of breakfast food could get ten or twenty-five cents for a hundred pounds such as they sell to you in the package? It is the small package—they look at the package and don't ask the price. I put in some six weeks in British Columbia on the coast, and among the Institute delegation there, there was a young man who was an expert in British Columbia. He had been sent by the Dominion Government over to the Hood river to get the latest ideas about the packing of fruit. He came back with certain ideas, and went round giving exhibitions of just how fruit ought to be packed. And I learned something there. The boxes were different from anything I see here. They were supposed to hold about forty pounds. They were slatted sufficiently strong so that while they might spring a little bit there was no danger of the box breaking. I found out, for instance you throw down enough of apples to make two boxes of the same kind, and almost without selection he would put four rows of apples in one box, the very select, the next box he would put four rows and a half into it, and there was hardly any difference in the appearance of those two boxes—one box contained the big apples, but the second looked about as well as the first because they had been separated from each other. I

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am in the habit of buying lambs—you will see the point—get a couple of hundred lambs, some 60, some 70, some 80, 90, 100; I keep them perhaps a month or three months. I would never think of putting those lambs on the market in that shape. Why? Because the drover will object—I can't sell those big ones. There is a lot of small things there, I have got to reject those altogether, give you less price. I don't give him the chance. I divide them up into lots. When he goes to the various pens, they are all alike and he does not object to the big lambs; he takes the small ones. Grade them honestly and we can sell the goods better.

Then another matter, we packed apples in Vancouver Island, on the islands lying in the channels, in the Chilliwack Valley up into the districts further north, and in the Fraser Valley and the Okanagan Valley, and we found this, that a 40 lb. box of apples there would just bring as much money, because they were so very much better. I prefer to do that than to sell a larger product for a small price because I am dealing on a higher level and I realize the higher the level of my business, the better man I am and the better citizen I am. I sometimes say—of course I won't say it here because it isn't along the same line—that the farmer who deliberately, systematically, knowingly and wilfully handles the poorest scrub he can put his hands on and is satisfied with it, he does not do that very long before he becomes a scrub himself. I want to handle a high grade of material in order that I may be a better man. In that very line, I may say, if I go into the market to hire a man to work on my farm, if I can get hold of a man who can harness his horse properly, draw a straight furrow, deep and solid and level, and continue that straight furrow, and can do all the kinds of work on my farm in the very best manner possible, I not only have a man who is worth a great deal more money to me, but I have a man who from the very fact that he can do that is a better citizen and a better man. Right doing leads to right thinking.

To come back, may be you think I am a Scotchman, but you are mistaken, I am a Canadian. I don't belittle the Scotchman a bit. I tell you, I believe that from those rugged hillsides of Scotland have come the best horses, the best cows and the best

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men that ever trod upon the heather. That doesn't hit a great many people here, because you never trod on heather. If you ask me the reason, I will tell you this, it is because the Scotchman has to work every day of his life from the time he is five years old doing something, and that is the reason why the Canadians—but, no, I won't say it. Do you know what I was going to say, why the Canadian is a little bit better than the American—I was going to say that too, but I won't.

In conclusion, I will simply say this, that we are not competing against each other to any extent. The people of the United States and the people of Canada, have alike the same great duty devolving upon them, that is, feeding the rest of the world; they have also the duty resting upon them to take those immigrants every day coming to our shores by shiploads, and by such a school system and such a system of government as we have to convert them into good American and Canadian citizens. We are working together for the same beneficial purpose, the benefiting of the human race.

Dr. Twitchell. I did not discuss this afternoon the Fruit Marks Act, because two or three times before, in previous years, we have had it up before us and gone through it in detail. This in explanation to our visitors why more time has not been given to it today.

This much we can say for 1906,—Maine apples, New England apples, were sold in the Liverpool market at an average of fifty cents per barrel less than Canadian fruit, because of the Fruit Marks Act there, and because our crop was not so graded and so protected by law. That is what we lost last year in the European markets on our fruit from the State of Maine. I have here a clipping from one of our exchanges, taken from a report of the American Pomological Society recently held, in which President Goodman dwelt at length upon this subject and finally put before the meeting a resolution, which was unanimously and immediately passed:

"The subject is that of the truthful labeling of each and every package of fruit put upon our markets. The dishonesty which is the more common practice of not labeling the barrels and boxes according to the grade of fruit actually put in them is the meanest thing in American horticulture, as many see it, and the

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effort in this case was to take steps to remedy the evil. In Canada, as Mr. McNiell fully explained, there has been a law in force for six years past, known as the Fruit Marks Act. He stated that it had been opposed at first by some growers and dealers, but now nearly all agree that it is very beneficial and favor it. It requires the truthful statement of the contents of the package by a brand or mark indicating the same, and a penalty which will be felt is imposed for violation of the law. The resolution at this meeting looked to the enactment by our Congress of a similar act. We surely need it, and we can get it if the people push for it. Not only will our dealers sell what they claim, and the consumers get what they pay for, but our fruit will be in better repute, and bring a better price abroad. The Canadians are now ahead of us in all these respects, and it is to our shame and loss."

It seemed to me, knowing the sentiment of the other New England States, and somewhat in our own State, that it was wise to push immediately the matter of legislation, and because through some correspondence with the officers of the societies over the country as far west as Oregon and California, and also in the Middle and Southern States we find such a diversity of opinion regarding what legislation should be, I have come to the conclusion that the wisest thing for us to do is to move in the New England States for legislation by our separate legislatures —we are cut off by ourselves a little mite out of the world— and now we can stand together; Boston is our great shipping point, excepting southern Connecticut, and there is where the grading and inspection might possibly be done. And if it is arranged that we accept the invitation of the Connecticut Society and meet with them in February—the delegates present of the different societies of course can only speak for their own —Mr. Burlingame and Mr. Hixon both assured me that they would have a representative there, and if we can arrange a meeting in Connecticut in February, there will be a bill formulated before that time and presented for discussion, specific bill, which may be adopted by individual states or may not, but which will aim at some legislation looking to conservative action, not extreme,—but looking to the protection of both classes, and with such penalties as may be desired; the matter to be discussed

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and then to be taken up by the several states in after meetings, and in the hope that legislation may come out of the discussion and the education and the work, which it seems to me is vital to us along these lines, whether it comes in one year or ten. We have taken hold of this in the State of Maine and we don't propose to let go until we get something tangible. I voice the sentiments of a great majority of this society, and yet I do not know of one who seems to be in a hurry about it. Let us find out what we want and then take hold unitedly and go to the legislature and demand of our State legislature that they give us protection. But that protection would be very little for us unless we could have you co-operate with us, New Hampshire, Vermont and Massachusetts. It seems to me this matter is of transcendent importance to the fruit interests, in order that we may reach what Mr. Elliott has touched upon, those higher levels. We all recognize the fact that he has presented, that it is only the man who is doing the very best, only he who is striving to improve, who grows, who is making his mark in the world or who is accomplishing anything. So this work, it seems to me, not only helps the man who is trying to help himself, but it forces others to lifting up of the standard of work in their orchards, to the growing of a better quality of fruit, and therefore to a better reputation in the market for us all. I wish I could ask of the representatives present, Mr. Wheeler, and Mr. Kinney and Mr. Clark, if they think it would be safe for us to accept the invitation and meet with the Connecticut Society in February. I have an invitation passed me by Mr. Knowlton from Mr. Miles, Secretary of the Connecticut Society, and also a letter from Mr. Rogers, their representative, expressing his regret that he could not be present, and giving us an invitation to meet with them in February. Will your society send a delegate there?

Mr. Clark. I think it will be so arranged although we have no meeting before then. I think arrangements could be made, and it is so near I think some one would be there any way.

Mr. Wheeler. I know perfectly well that our society would be only too glad to send representatives to that meeting in February to discuss this matter further. I was rather unprepared to discuss the question here today, but I know we have men that

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can and will talk on that subject and will go to Connecticut well prepared to act in accordance with the rest of New England on the subject. It is a subject that certainly is of very great importance to fruit growers.

Mr. Kinney accepted the invitation in behalf of his society.

OPPORTUNITIES FOR YOUNG PEOPLE.

By Prof. FRED W. CARD of Pennsylvania.

I thought I would talk tonight a little about the opportunities for young people. This is a day of opportunities. We see them in all lines of work. We see men who have reached high attainments, have begun in low places and worked their way up. The other day all the wheels of one of the great railway systems in the West stopped; not a wheel turned for five minutes in honor of the man who had been its president, the man who begun at the very bottom of the ladder, who climbed his way step by step to the highest position in that railroad.

Sometimes we think perhaps that those chances for growth, for progress have gone by largely, that all those opportunities have been utilized, have been taken, and that at the present time the young man does not have the chance which he had before. But I think this is a mistaken notion, that the opportunities are still with us if we have but eyes to see them, whether it be in the lines of business, professional, mechanical, or any calling whatsoever.

But I am concerned chiefly, as we all are perhaps, most of us at least here tonight, with the opportunities offered in agriculture, because we are here, a meeting of agriculturists—one phase, I believe the best phase of agriculture, but many of my friends would differ with me as to that. Now what are the opportunities which agriculture offers to the young men or the young women—I wish there were more of them here tonight.

In the first place there are opportunities for bright, intelligent men as teachers and experimenters. Our agricultural colleges, our experiment stations, are constantly calling for more and more men. Men are dropping out to take up other callings, and new men are needed. Those institutions are growing. I

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don't know how many are employed in the United States at the present time, but I think it is safe to say that every state in the Union employs from ten to fifty men, perhaps some of them more in connection with the college and experiment station work. The Department of Agriculture at Washington employed, the last time I knew, something like 3,500 men in agricultural lines, in different lines of agriculture.

There are opportunities also for the men who have the training and the executive ability to handle funds and handle business, to take the capital belonging to other men and utilize that to bring a return in agricultural lines. Men of wealth are constantly seeking for an opportunity to place that wealth where it may be safely employed and yield them a business return. They don't ask for fancy returns; they know that those fancy returns are not to be gotten with safety; if they can get straight business returns on their capital, they will be glad to put their money into land. Many of them would. There have been in the last few months particularly good opportunities for investment in securities, but look at the condition today, how the value of those securities has dropped fifty, one hundred per cent in some cases, and the man who thought himself worth $50,000 six months ago may find himself worth $25,000 or $30,000 at market prices today. Now money put in land does not meet with that great fluctuation, and there are shrewd business men who are looking for opportunities to put their money in that way. Many, many more of them would do it if they could have the men to manage that land when they get it. There are few men who can take a business proposition and carry it through to a business issue. Now the young man cannot expect to do that when he graduates from college, because to make a successful business requires an ability which cannot be imparted in the class-room. It requires natural business ability. It requires executive ability which can only come with age and training. The man who has within him the possibilities for that line of work may readily get the experience and grow into positions of that kind.

More and more men are seeking summer homes, who find their homes in the city and are looking back to the farm as they grow older. It is the almost universal experience, you meet a

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man past fifty years of age who has spent his life in other callings, he wants to go back for at least part of the time to a farm; and after he has the farm, then he needs some man to manage it. There are opportunities for men in those positions, and many of them are most admirable ones so far as salaries are concerned.

But I am concerned more particularly with the opportunities which the farm itself offers to the young man or the young woman, and I believe there lies one of the best opportunities that can be offered today in any line of effort. What does the farm offer to the young man who has a taste for it? Now let me say right here, that this of course goes back to that old question, Should the young men leave the farms? Should they follow some other calling? And let me say right at the outset that I believe there is no special virtue in being a farmer. The character of the man lies far and away above the calling which he follows. But there are young men who may well stay on the farm and there are young men who ought not to stay on the farm. And first, of those who ought not to stay, there is the young man with a special bent. There are boys and there are girls who nearly from the time they are out of the cradle are designed for some special calling in life. There is the boy who has a natural talent for medicine; another one, perhaps, has a natural talent for mechanics; another one for law, it may be; another one possibly for commence; those boys who have that special bent for some one thing ought to follow that lead, and it is a great mistake if we attempt to carry them away from it. Now there is another class of boys that I believe ought not to be kept on the farm, and that embraces a very large class,—the boys who are willing to be led. Too many men in this world are willing to be led; few men are willing to lead. Now the man who is willing to have his work blocked out for him to follow some one else's lead, some one else's direction so long as he lives can probably get along and get a living easier in some other calling than he can on the farm. He can at least until he reaches the age line late in life. The man who expects to succeed in farming must lead; he must take the reins in his hands, have resourcefulness, be ready to meet emergencies when they come. He must not expect to depend on some one else to tell him what to do.

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There are some boys who, I believe, ought to stay on the farm, and that is, first of all, the boy who loves the farm. There are such boys, and let me say right here, that I believe there would be far more such boys but for the parents' misapprehensions. As a teacher in agricultural college work, over and over again have I met this situation; a father or a mother comes to an institution with a son, or perhaps with a daughter, and they express themselves something like this: I want my boy to do something where he can get his living easier than I have got mine. That father thinks that farming is the hardest calling, that something else will be much easier. It is but natural. We all see the bright side of the other man's occupation, because we cannot see behind his door to see the unpleasant things. Concerning him we can see the bright side. Perhaps we see too plainly the unpleasant things which concern us and we overlook to a certain extent the blessings which we find in our own calling. But, I say, there are boys who love the farm, and those boys ought to stay there, because the opportunities are as good as at any other calling, I believe.

Then there is another large class of boys who I think may well stay on the farm, that is, the boys who may interest themselves in anything. That embraces, I suppose, by far the larger class. It is the exceptional boy, the fortunate boy I may say, who knows just what he wants to do. The most of us had to grope around and flounder about to try to find out what we were good for, and perhaps we never found out. The most of boys can interest themselves in anything. You put them at a machine, they become interested in it; put them at the study of a plant and they become interested in that; the study of an animal, mathematics, language—the bright, intelligent boy will interest himself in anything. Now we may well show to that type of boy the opportunities which the farm offers. And what are some of those opportunities?

In the first place, it offers the opportunity for healthful employment. Over and over again do men as they come along late in life find their health failing, and some of our most successful farmers are men who have been driven late in life to the farm by failing health, obliged to get out from some calling. It is hard work. Anything is hard work which succeeds. But

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it is healthful work, and an occupation which we need not fear at all so far as health and enjoyment are concerned.

Again, the farm offers a continued livelihood. I asked a business man with wide experience some months ago what percentage of men who invested their money in mercantile lines and manufacturing, were able to receive their money and continued livelihood so long as they lived—what percentage lost their money? Thinking it over a little, he said he could only give a matter of judgment, but he said he thought perhaps fifty per cent of those who put their money into commerce were able to get a livelihood from it through their life, and perhaps eighty per cent through manufacturing; but he thought of that fifty per cent in commerce a large proportion would finish by working for some one else,—in this way: a man may be established, we will say, in the shoe business in a town. The department store comes, and he becomes the head of the shoe department in that great establishment. Perhaps he may remain there so long as he wishes to remain; but more than likely, as he grows a little old, not quite so alert, not quite so up-to-date in finding the best styles and bringing about sales, a younger man is wanted and he is obliged to drop out. I am reminded of a story of a gentleman in the city of Quebec, who on an icy morning started to go down a long flight of steps, and who losing his footing went down bumpety-bump onto the ice below. As he got well started he was somewhat chagrined to see a lady ahead of him. He was not able to steer his course very well and the consequence was he ran into the lady, she sat down on his lap, and together they went bumping down the steps to the bottom. When they reached the bottom they were both somewhat disconcerted, and she not getting up quite so quick as he thought she ought to, he said "Pardon me, madam, but this is as far as I go." Now many a man reaches early in life a point which is as far as he can go. He reaches that dead line which faces every man who is working in the employ of others, and it is coming early in life in the city in these days. Young men are wanted, men who are alert, active, bright, energetic, and the man who has the experience perhaps may find that that experience does not count against the alertness, the energy of the young man, and he may be obliged to step out. And what is that man going to do?

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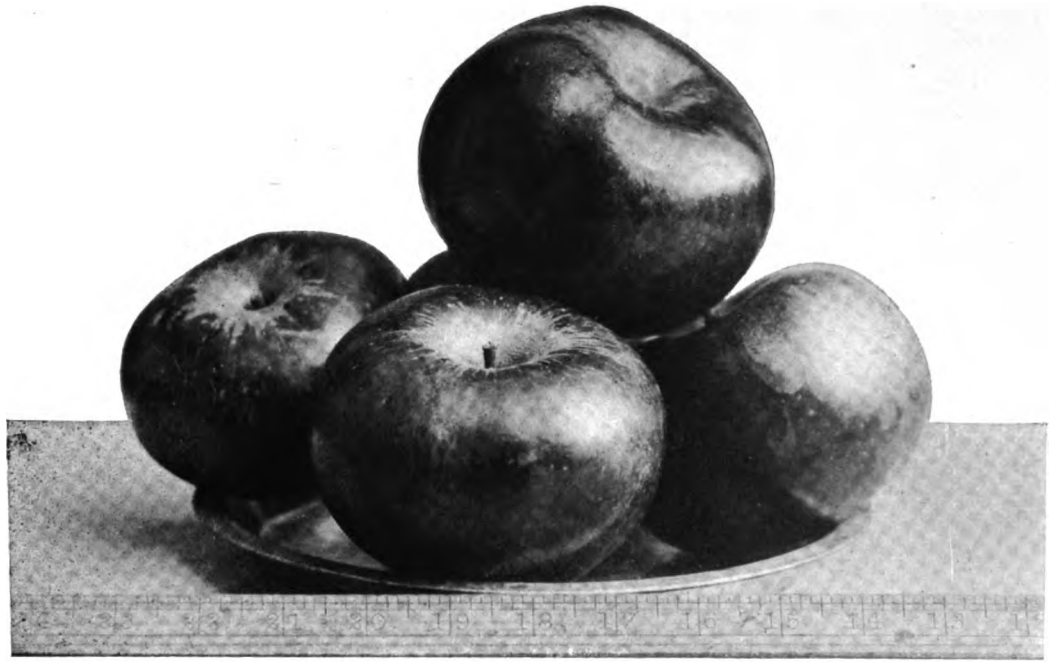
He finds himself in a very unenviable position, because he has done that one thing and he is not able to take up the other lines of work which he may need to take up for anything which will afford him a livelihood. Now the farm has the advantage that it offers an all-round development. I know of no calling in these days which makes so much a full man as the work of the farm. I went through the other day a large paper mill in your State and I saw men doing various pieces of work. I saw one man picking blocks out of a large tank of water, throwing those blocks into a machine which cut them up into chips—taking up one block, throwing it into that machine, taking another block, throwing it in, hour after hour, block after block, day after day, week after week, year after year perhaps. What was there in that calling? Monotony,—can you think of anything more monotonous. That is only a type of the kind of work which all those men were doing, one thing over and over. What was the training? What is that man worth for anything else by the time he has spent ten years putting blocks into that machine? That is simply typical of all lines of manufacture, and it is one —I was going to say the curses—perhaps not in the broad commercial sense, but it is a curse so far as mankind is concerned that our present day system drives men to do one thing, which narrows their life down to the narrowest possible horizon—little more than that of the horse which we stand in our stable,—indeed, less variety in it.

The man who works on the farm not only gets this broad training, but he has opportunity to bring into play all the education, all the training which he may have.

Again, the problems which confront him are numerous and varied. He has opportunity to observe all phases of nature, all phases of his work. Perhaps in no calling is there a better opportunity to enjoy the fruits of an education than upon the farm.

Further, the farm offers a modest financial return. I cannot say to you that there is a prospect of becoming a millionaire by means of farming, and indeed I am glad there is not, because what does one gain by becoming a millionaire? We get such a wrong sense of proportion. We are constantly striving after dollars. We think that that is the great desideratum in life.

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MAINE FARMER PRESS, AUGUSTA

Plate of Wolf River exhibited at the Gardiner Exhibition

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We chase after it day after day, year after year. When we catch it, then we have forgotten what we wanted of it. We don't know how to use it. We think that it is going to make us happy, but when did dollars ever add to happiness? Certain things we must have. We must have food, shelter, clothing, but beyond that what we get has nothing to do with happiness. What matters it whether the front of our home is brown stone or clapboards? Whether the carpet we walk upon is rags or Wilton?—nothing to do with happiness. "Seek happiness o'er all the earth and she shall but follow on thy trail or sit patiently on thine own door-step and wait thy return." Yet we are all seeking for dollars, and it is right that we should in a measure, and the farm furnishes a moderate financial return. And perhaps in that line it is only just, and I am glad to speak of the opportunities of Maine in fruit growing. It seems to me that we have here in Maine, just along the line of this meeting today, most admirable and splendid opportunities. Why does fruit growing offer good opportunities? In the first place, it calls for only a moderate investment. In many other lines of effort today the investment demanded is so great it is very difficult for a man to get a foothold and to establish an independent business in commerce or manufacturing; it is almost impossible except as he unites with others to do it. But in agriculture he can begin with a moderate investment in various ways. Now in the first place, if we take apple growing for instance, the first value of that land is only small. We do not need to have expensive lands; in fact, the very lands are oftentimes the least valuable which are the best for orcharding purposes. Then there is only a moderate investment needed in the way of buildings and equipment. The buildings are not expensive. The equipment is far less expensive for fruit growing than it is for dairying or many other kinds of work. The trees are not costly. Indeed we may begin and propagate them with very little expense except for labor if we are willing to wait a little. And then, above all, we have an appreciating investment rather than a depreciating one. Build a manufactory or a dairy barn, complete it today, tomorrow it is worth less than it was when you finished it. Each day and each year reduces the value of that building or that factory. Plant an apple tree and tomorrow it is worth

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more than it was today. That investment is growing better all the time. It reaches a good age before it begins to go the other way. That is an important factor in fruit growing.

The labor problem is the greatest problem. For instance, compare the dairy with fruit growing, and compare the feed of the cow with the feed of the tree. Now feed for the cow is expensive, but in fruit growing the fertilizer bill is the least of any line of agriculture I know of. We can get all the nitrogen we want from the clover plants we turn under. So from the financial standpoint fruit growing offers excellent opportunities. It offers a safety of investment. I know of no line, even of agriculture, that offers more safety than that, and agriculture offers the greatest safety of any line. In many lines of investment a little turn in the tide of affairs may take the value out from under them. It is not so with the farm. Conditions may be unfavorable, returns low for a series of years, but the investment stands.

You have here excellent advantages for marketing fruit and the more fruit you grow the better will those advantages be. I have been impressed in the last weeks, travelling through the State, with the great potato houses I have seen all along the railroad to handle this crop which you grow so extensively. The fact that you grow potatoes in large quantities affords you far better opportunities for marketing them than you could possibly have if only here and there a man grew potatoes. If instead of here and there a man growing apples, you had hundreds of orchardists, you would have the same conditions for marketing apples. The buyers would be here seeking them. You would have train service and shipping facilities from all points.

Then it seems to me that here in Maine you have some particular advantages for apple growing. You have the climate which gives you the very best of color. In few localities in the whole country could you go into an exhibit and see such high colored fruit as you find here—perhaps in the Northwest and Minnesota, but they are limited greatly in the varieties. Why, you can get the highest quality, and then you can get apples out of season as compared with a large part of the apple growing region of the country. I was astonished, coming into the State here since the first of November, to have given me a Porter

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apple, kept in an ordinary cellar. In northern Pennsylvania that Porter apple would have been gone by the middle of September at the latest. Perhaps we never think of it as anything but a summer apple. You can grow those summer varieties and put them in after the apples from other localities would be gone. It seems to me there must be a decided advantage in that. There are some of the advantages which are offered in a financial way.

The farm offers also an opportunity for usefulness. As I said, we make a mistake in thinking it is all dollars. It is not all dollars; we want something more than that. We want a life. We want the opportunity to make our life count for something in the world. Now no calling monopolizes the opportunities for usefulness. In all fields of effort a man can make himself useful to the community. Perhaps you may think that the farm is circumscribed, narrow, that it does not give you a field for making yourself felt in the community. But if you were to go into the city where you know not your next door neighbor, just one little atom in that whirl and swarm, what chance have you to make your influence felt as a young man under those conditions? In a farming community you know every one. The young man who has within him the ability can make his life count for far more for the upbuilding, political, moral and in every way, in a community, than he can in a larger community. And the man who takes his place on the farm can make his life count. We need good farmers, men who shall set good examples of how to grow good crops and get good returns, but we need educated men, men who will take their place in the community and stand for the best in life, more than we need farmers.

The farm offers above all things an opportunity for home making, and it seems to me that in that lies one of its deepest appeals. It is the one thing which appealed to me more than anything else in all the years I was teaching. As a teacher my position was reasonably secure, but I never could have a home in the full sense of the word. I never could even plant a strawberry bed and be sure I could pick the fruit from that bed. Perhaps the landlord would for some reason want that house, or I would decide to move to another house. Two or three

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times I have done just that thing, planted a strawberry bed and moved and let somebody else pick the fruit. Now the man and the woman who live on a farm have the opportunity to make the home which is the best home on the face of the earth. And here lies the chief opportunity of the young woman. There are fields open to her in these lines of agriculture. She may succeed commercially in farming. She may succeed as a farmer; she may succeed as a landscape gardener. There are plenty of fields for her to succeed in, salaried positions, but above all her opportunity lies in making the farm home the best home it is possible to make. Now that home, it seems to me, should be something more than a place which contains merely the comforts of life. Every woman wants her home to be something more. She tries to make it just as beautiful and attractive within as she can make it; she adorns it with tapestries; sometimes she is very dissatisfied, nevertheless she tries to make of that home the best possible home which she can make. Now, I want to think more of the outside of the home. I want to make a plea for the surroundings of the home. Because as I have passed through this State of Maine, I have seen neat farmhouses, neatly painted, tidy, but there has been very little, almost nothing of ornament about those homes outside. Of course you have a hard climate—it is not like the climate farther south, but nevertheless there are plenty of things which thrive here—must be—which would beautify these homes. Now when we start to plant about a home to make it attractive, what can we do? We may set out a plant because we admire the flowers that plant produces. We usually set out a rose bush because we admire the roses, not the bush on which the roses grow. We may put out a plant because we admire the plant itself for its beauty. We may set out plants because we can make a pattern bed, as we see so oftentimes about railway stations and places of that kind. But better than all, we can put that plant in as a part of one picture, of the scene as a home, which shall help to make the other surroundings of that home a scene which is attractive from all points of view. Now the canvas upon which we must paint that picture is the greensward, and we must never lose sight of that. We must never fritter it away. We want to preserve the open lawn in front of the

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buildings. Then we want to plant about the borders, about the house itself, the shrubbery and the flowers which shall make of it an attractive picture. Now the landscape painter when he starts to put a picture upon canvas meets with fewer limitations than we meet with in working that picture in living plants. If he thinks his picture will be more beautiful putting a mountain or water scene in the distance, he can put it in. In the first place he selects the point of view. We must accept it and look at his picture from one point of view. Then he can improve it in those ways. He makes a picture which remains always the same. We must make a picture which changes from day to day, season to season, year to year. It calls then for the highest artistic ability to make that picture as it should be. The essentials are first, the law, and then the grouping of shrubbery, flowers and trees about the borders of that lawn and about the home. And we want to remember to preserve all the most attractive views from that home; to sit by the windows which you use most and see what are the attractive scenes, and take care that there are openings in those groups which enable you to look at the view in the distance—it may be a bit of water; it may be only a church spire; it may be only a set of farm buildings; but if you frame that object with plantings, so that you look through and see that, it becomes at that moment attractive. There may be objects which are unattractive likewise, and we want to shut those out. Now we can put about the homeliest farm buildings a very little planting which shall partially screen those from view and transform an unattractive scene into one which becomes attractive. A little thought, a little study can make of any home a delightful place and a picture. And then we want to do all that we can do to make the home within as bright and happy as it may be. Let us realize that the children within that home are of more importance than the dollars which we are seeking to bring to it. It is of far more importance that we help those children to the noblest impulse of life, that we help them to make the home a home which they will always think of with pleasure and be glad to return to even if they leave it for some other calling, realizing that boys and girls are worth more than dollars and land. Now we do not need to go into the distance to find the opportunities.

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You all remember the legend of the rainbow, that if we could find the end of the rainbow we should find a hidden pot of gold. How often we have thought that perhaps at that point we should find something—in some other climate, some other calling, lies the opportunity which shall enable us to make something of life, make more of life than we can here. But opportunity lies not in the distance, it lies in the man who can see it. All over this country we find men who have seen an opportunity, have developed it, and have made a business and a name for themselves in every way. It is not necessary to go to distant climes to get the opportunity. They lie about us everywhere. Some eye views the rainbow arch which ends upon your head. Beneath your feet lies the hidden pot of gold.

TID-BITS FOR THE GARDINER BANQUET.

President GILBERT.

If the fruit growers haven't a right to be happy, where shall we look for enjoyment and pleasure. As the old song has it "Weep when we must, but now be gay; life is too short to be sighing long," so let us this evening express our joy, respond to our feelings, and especially on an occasion of this kind celebrate the joy we feel and the bounty with which we have been rewarded for our year of effort.

I was born and brought up in an orchard. In my boyhood days, we boys in the morning, in our pajamas, would run out the back door for the High-Top Sweetings that had dropped from the trees during the night, vying with each other who should get there first through the dews of the morning. It has stuck to me to the present time. I planted the seeds, grew the trees that are now rewarding my labors with their bounty of fruit. I was planting some of those trees, my little boy was with me and he had been teasing me as boys are desirous of wearing the apparel of men, for a pair of rubber boots. I didn't feel that he was quite old enough to put on the rubber boots. I suggested to him that I couldn't afford to buy the boots then. As he played around the tree that I was setting, he says, "Father, can't I have some boots when these trees begin to

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bear?" This autumn this little boy has helped pick 500 barrels of fruit from those trees. He can have the rubber boots now. He has helped me to grow those trees, he has been a faithful son, and is today exemplifying the efforts he was then trying to make in my assistance. I appreciated it. I appreciated the trees. I appreciate what they are doing. I can further see greater possibilities in the planting of trees. It has been my pleasure to encourage others to go and do likewise, and I have seen the bounty bestowed in many orchards from that time to the present time that my own hands were instrumental in starting and producing the results that are now gathered from those trees.

I look upon it as a laudable work that this Society is engaged in to encourage the planting of trees, which have been rewarding my early efforts in those directions, and I only wish that the seed that this Society has been sowing and their endeavors which they have been performing with so much of intelligence and so much of earnestness and so much of willingness shall result in bountiful rewards in the end. There is no limit to what we can do in fruit-growing in our State. I wish that the general public could appreciate what I know can be done and what the land planted to orchards will do for an intelligent effort. There has been marked progress in recent years. The fruit-growers of our State have learned lessons that they are now putting into efforts and receiving the bountiful reward which to the industrious and intelligent hand is ever ready from nature. It is a pleasant occupation. Do you wonder that we boys enjoyed running into the orchard, and enjoyed the fruits of the orchard? Do you wonder that enjoyment has filled us all these days of these busy years? And are we not entitled to something of the pleasures of life, and shall we not celebrate the annual return of the pleasures and this reward in which we have been engaged? I look upon it as a laudable effort. I look upon it that an occasion of this kind in celebration of the annual harvest is a fitting thing for this Society and its friends to engage in, thus drawing our attention to the advantages we are enjoying and to the possibilities of further endeavors in this connection.

We are present on this occasion in the city of Gardiner, near to the center of fruitgrowing in our State. This Kennebec

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river, this Kennebec valley, with its immediate vicinity, if not in this particular city itself, the progressive fruit growing of the State of Maine emanated. It has gone out from here and traveled across the broad State of Maine, covering its entire limit from south to north, from east to west, not in the same bounty in all places, but in no place with greater bounty than has rewarded the efforts in this and near by this locality. We are here by invitation of the city of Gardiner. Some one today mentioned the fact, or hinted the idea that Gardiner was doing homage to the city up the river—wasn't that so, or am I mistaken about it? It is our privilege tonight to do homage to the city of Gardiner. And well we may do so. So far our stay here has been pleasant in the extreme. So far the endeavor that we brought with us has been rewarded in the full bounty of the most lavish expectation. You have attended not only on our wants, but you have attended on our efforts. You appreciate what we are here for. Your appreciation of what we are here for is an encouragement to us to push our efforts. It is just to our Society for me to say at this point that the efforts of this Society from its start up to the present time, the efforts we have put forth individually and collectively, have been entirely without the reward of money, but for the promotion of the business which we represent. I often query whether my associates in this work want to exchange, or would if they could today, the pleasures, the satisfaction, the results that have come from their gratuitous efforts, for money. There is a pleasure in laboring for the good of a cause without the thought of a per diem or a compensation coming along with it to mar those fruits in any degree whatever. We are worshipping too much the almighty dollar, and while the effort of all hands is very largely in the direction of the compensation, and I believe we are cultivating too much an idea in that direction, and especially with the young that the real thing to work for in life, and I fear sometimes the only thing we are encouraging them to work for in life, is the almighty dollar—too much so,—it is well for us sometimes to sit down and bring to mind that there are other things to reward us for our labors than money; other things that are more valuable; other things that will make us richer in the end and give us satisfaction in the end that money never can

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fill. We are to work so I believe in a good cause. We are glad to know that you appreciate that fact and that you do us honor by your presence at the meetings that we have had and by this entertainment that you have so sumptuously provided this evening and graced with your presence in so large numbers, as you have. Let it go on record to the credit of the city of Gardiner and its people and their hospitality. So it is fitting for us to do honor to this city of the Kennebec.

Mayor WILL C. ATKINS, Gardiner.

I supposed that when I spoke my piece last evening that ended my connection with the speaking part of the program. I sat here tonight in all serenity and security, and I felt a good deal as Daniel is said to have felt when he was thrust into the den of lions and looked around upon the hungry beasts, and finally said—"Well, if there is going to be any after dinner speaking here tonight I will not be the one to do it." Now in the short space of five minutes it will be impossible to tell you all the good things about Gardiner so I am going to refrain and do as all speakers are supposed to do at after dinner speeches, either tell a story, sing a song or read a poem. Mine will be a story and it will be short. When the visitors began to come in in such numbers and it was doubtful if they could be entertained, I thought it might be necessary to have recourse to the expedient employed by the country hotel keeper. Late in the evening two drummers struck a small country village and coming to the hotel found that it was completely filled. It seemed that the landlord of the hotel was also the sexton of the church and the church was situated next to the hotel. They asked the landlord if they could have entertainment for the night and he told them that he was completely filled up, but as they were leaving much disappointed he called them back and said, "I am the sexton of the church here and perhaps if you would like you can go in there and spend the night." In the absence of a better place of entertainment they chose the church. Along about midnight the bell of the church began to ring and the landlord was awakened from his slumbers and he ran over to the church. He rapped on the door. It was locked, and after a considerable

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knocking one of the drummers came to the door, and the landlord says "What does this mean, your ringing the bell this time of night?" "Well," he said, "this is an adjunct to the hotel and when you want anything we supposed you had to ring for it." "Well," he says, "what is wanted?" He says "We would like to have you send two cocktails to pew 13." Now we didn't think you would take advantage of the last part of that story, but we didn't know but what we might be obliged to take advantage of the first.

I want to tell you one little experience I had in my somewhat extensive practice before the justices of the peace in this county, and it seems to me quite funny. Perhaps some of you have heard it; perhaps not. I was trying a very desperate criminal for the offense of breaking the Sabbath day and after the justice had heard all the evidence he fined the respondent $2. My client took the $2 out of his pocket, threw it down on the judge's desk and said "Now Judge, I want a receipt." The judge said, "We don't give any receipts in criminal cases but I will minute the fact on the docket." He says "I know, Judge, but I want a receipt. When I go to heaven and I get up there before the recording angel, and he opens the debit side of my account and he finds there, debtor to breaking the Sabbath $2, then" he says "with those cherubim and seraphim a-singing and a-dancing all around me, I don't want to have to leave that beautiful place and go hunting all over hell for you and your docket."

Mr. WHITMORE, President Gardiner Board of Trade.

On behalf of the board of trade I extend to you a very hearty welcome to our city. Though your accommodations may not have been as large as we could have furnished before the Coliseum was burned, still I hope that the lack of the accommodations is more than made up by the hospitality of the members of our board and the citizens of Gardiner. I also wish to say that we were very much pleased with your program of last evening. I was considerably surprised at the number of apples shipped from this State; though I knew the crop had been large, I had no idea that there had been so many sold or shipped out of the State. And I was also surprised some seasons ago when

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I returned from one of my trips in the south and landed in New York, to find a very fine apple, a very fine flavor and color, shipped from the state of Oregon. That is the first time I ever knew that apples were raised to any great extent in the state of Oregon. I was also much surprised at one time when I was in Havana and was quite apple hungry, in going into the markets there and looking over the fruit and seeing what poor fruit there was for sale, and I purchased one apple—and that apple was called the Ben Davis—and what do you suppose I paid for it? ten cents for a Ben Davis apple, but I was apple hungry and I wanted it. That reminds me of the first time my attention was called to the raising of that apple in this State, and that was a man by the name of Benner who lived in West Gardiner but has since died. He purchased nursery stock of a salesman thinking they were Baldwins, but when the fruit appeared they were an apple that neither he nor his neighbors ever heard of. They shipped them to Boston and from there they went to Liverpool and he got the highest price of any apples that he ever sold, somewhere between three and four dolars per barrel, and he derived an income from that orchard larger than he derived from all of his other crops.

Secretary Knowlton—About thirty years ago this Society held one of its earlier meetings here in the city of Gardiner. Only two or three of them are present at this banquet tonight. It was considered then an excellent meeting. I have read the report in years back, how they got together, and did good work and had a most excellent meeting. I wish some of those men who have passed away—one a prominent citizen of your own city here who took a great interest in the Society for many years of his life. I wish some of those men could look down upon us here tonight as we are assembled at this banquet, and as we have assembled across the way, and compare results and see what progress we have made. It would be no reflection upon their work, but it would show to them that the work they did has progressed and gained in power and strength as the years have rolled along.

Now I am exceedingly proud of this meeting. And I am proud of the work accomplished at this meeting. There are certain elements which have entered into this meeting and its

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organization that have contributed to this grand result. The first of all is the cordial invitation and the cordial reception which came from your board of trade here and the citizens of Gardiner. The first time I came here after the committee was chosen, the chairman of the board of trade, represented by your mayor, said to me "Tell us just what you want and we will do it." Well, now, that was a beautiful sentiment, and that seems to be the sentiment that has actuated all the local movements here from the beginning. What we have wanted them to do they have done. Yes, they have done more than that, and to them we owe a special debt of gratitude as a society for what we are doing and what we are accomplishing here at this meeting.

Then there is another factor which I wish to speak of because it is one of the most potent factors in the State in promoting the very business which this Society is working for, and that is the hearty, whole-souled co-operation and assistance which the press has given us from the first. I am glad that so many representatives of the press have been here. I only wish that I could have devoted a little more attention to them.

Another thing which has contributed very much to the success of this meeting came about through a meeting which was held in the city of Worcester. I won't attempt to tell you what that meeting was called for, but it was a meeting at which were assembled representatives of all the horticultural societies in the New England States. It occurred to me while I was there that if a meeting of that kind could be held down here in the State of Maine with us, that it would be one of the finest things we ever had, and so in behalf of the Society I took the liberty of inviting the various societies there represented to send delegates down here, not so much to help us as to bring the fruit interests of the societies into harmonious touch and action. A hearty response came and we have with us here today or have had with us at our meetings, the representatives of all the societies except two. One delegate was chosen to be here and expected to be but sickness in his family kept him at home. I am well pleased with having these representatives here.

Now there are one or two other things along this same line. Yes, there are two—I will try and not forget one while I am

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talking of the other. One is, that for the first time since the commissioner of agriculture was created so to speak, or since the office was created, we shall have with us tomorrow Commissioner Gilman and his full corps of institute workers to take part and assist us in our meeting. It is a grand idea, because it brings us into harmonious touch with the agricultural department which is doing such excellent work in the State.

Another thing which I feel proud of and want to speak of is the generous outpouring of representatives who have come from the University of Maine and the Agricultural Experiment Station, and I hope that being with us on this occasion in the way they have come may be one of the features of future years in the affairs of this Society.

I have been very proud in looking over the records of the Society, in noting what kind of work the Society has been doing in this State. And the most prominent thing I see is that all the time from the very first, since this Society was organized, the Society has stood boldly and squarely for the best things in fruit culture. They have advocated the best varieties, the best culture and the best methods of selling their fruit. Those are the three things above all others for which this Society has stood. I am proud to be connected with an organization that always stands up for and advocates the best things. And I am pretty sure of another thing, and that is the grand success of this meeting which we are having here now will be such that the good people of Gardiner and of Kennebec county will want us to hold another meeting here before a great many years, and for one, if I am a member of the Society then, I shall take pride in being here with you.

Mr. T. L. KINNEY, President Vermont Horticultural Society.

A few years ago I had the opportunity of visiting various parts of this State for a few days. We rode down from Montreal, through this beautiful State, down to Portland, and up this beautiful river this morning, and the exercises of today indeed have filled me with such overflowing anxiety for the horticultural and the pomological interests of not only the State of Maine but of New England, that I don't know hardly what to say. It seems to me that as I think over the State of Maine

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and what it is doing in horticultural lines that you grow more and more wonderful in my mind, the more I know of you. And yet, it is no wonder that you are a great State, with your neighbors from the south, from the north, pressing down on you with all their force for the products of your soil—no wonder that the State of Maine can grow the biggest Irish potatoes in the world, that you can grow the most beautiful red apples that were ever grown. These calls are making a demand upon you, and when you have the natural resources of course you respond to them, and I am glad to see evidences of this in your exhibits. And as I look over the audience here tonight and look over this wonderful spread, these beautiful, bright, intelligent countenances, indeed I feel grateful that I am here tonight. It seems to me that if I were to live my life over again, and should have a dozen boys, that I should send eleven of them up here to Maine, and that other one, that twelfth one, of course it would be the dearest one of all, the last one always is, well, after your President has been telling us about those 500 barrel boots, I should send him here too. Whenever I see in the agricultural papers, as I very often do, an article from the State of Maine, I read it through and through, and I never have failed to find something that was worthy of attention, worthy of study, something that is solid like your hills and your mountains and your soil and the products you exhibit today. And I am proud of the State. As I read these and become better and better acquainted with you, and converse with you as I have today and expect to tomorrow, I feel that I am proud and happy to think that I am in Gardiner tonight, and the State of Maine.

A. A. HIXON, Secretary Worcester Horticultural Society.

Now there are plenty of people who will tell you all about fruits, and what you ought to do, and the benefits to be derived from growing of fruits, and I have only got five minutes and it is not time enough for me to say much of anything to you about fruits; I should want more time than that. But I want to call your attention to one thing, a crop that you don't think of, and a crop that the State of Maine will have to produce or you won't raise any fruit, and that is boys and girls. You have got to

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raise them or you will go out of the fruit business. And I am sorry to say that the American family is not producing as much as it ought to; it isn't producing the right number per family that it ought to today. And that is a crop that you have got to raise. Now I say this in the interests of horticulture and pomology, and I hope that you will raise a good crop of children in the State of Maine as well as a good crop of Northern Spies and Baldwins.

EDWIN H. BURLINGAME, R. I. Horticultural Society, Providence, R. I.

I am here from a small state and I don't think anybody needs to be told that a state,—well it hardly equals territorially some of your counties, it don't equal Aroostook county and I think there are two others that are larger than that state—that it has made no great progress in pomological work. Our State Experiment Station, the State Agricultural College in line with it—has been doing splendid work. The state at large, taken commercially, is not an apple growing state at all. You can count on the fingers of one hand all the orchards of any size in the state. It has one thing to talk about or think of in the past. Every one of you fruit growers raising Greening apples knows that you owe that apple to Rhode Island. The original tree—although there is a question as to whether it is one or the other—but there is one that claims the honor, two hundred years old, and standing today. We have given the Greening apple to the country. We can boast in other ways: we have given to it cotton spinning and the whole cotton industry. And more than that, while I see religious subjects are barred, I will say this, that the noblest man that ever spoke for religious thought and freedom, Roger Williams, was the man who founded the state. I don't need to tell you, but there it is.

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JOHN W. CLARK, North Hadley, Mass.

I come from Massachusetts, and I bring you their welcome, and also congratulate you for them upon the bountiful crop of fruit you have this year. Providence has smiled on you more than it has on us. The winter was very severe with us—it has been the last three or four winters although we are further south than you, and our fruit shows more or less injury. But I hope that next year we can welcome some one from your Society, or some ones, the more the better, to our Society meeting, and you can congratulate us on what Providence has done for us—not that we wish you to have any less fruit but we would like to have the conditions the same as this year when other people haven't much and you have a great deal and prices are good; because that is a very important item in the last wind up, that prices are good and that we get something for our work.

And I also want to thank your mayor for his generosity to us in making this afternoon pleasant to us in giving us the trip to Togus. I know I speak for myself, and I think for all the party that took advantage of his generous offer.

I am glad for you that you have such a broad outlook, that nature has done so much for you throughout your State, and though I don't belong here, still I have had the privilege of seeing considerable of your State, as I think this is the sixth or seventh time that I have been down here, and I have been over your State not quite from one end to the other, and still in quite a number of places and I have noticed that you can produce good fruit; but don't think that you are doing anything to what can be done. Although some don't like to hear me say it, I simply say we don't grow any fruit yet. The ground hasn't been broken. We don't get anything the results that we should. The possibilities, the half has never been told. It is here in your soil. Your fruits as they stand in the market have a name that very few states can claim. Your fruits are solid in texture, bright in color, and have the name of keeping equal if not superior to any. But there is one thing that I will say here—in the markets they are a little under size. Now that simply says that you want to grow them a little better, and if you will you will find it will pay you big interest on the money that you put in. I know one time—I can't tell you just when—I was at an insti-

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tute meeting and I was speaking of the advantage of thinning fruits, that is thinning an apple tree, picking off the fruit. Well, three or four years after I was in the state again and some one came up to me, a stranger to me, and said: "I was at such a place, such a time, when you were there and you were telling us something about thinning fruit, and I went home and I tried it on a part of one tree, and you have no idea the difference it made in the looks of the fruit." "Yes, I do, that is just what I was telling you." And I felt well paid by what that man said to me. I thought that I had done something that had done some one some good. And if you never have tried that, when you have a crop of fruit, try it and you will be surprised in the difference it will make in the looks of your fruit. It isn't the amount of fruit—it is to grow good fruit. And it isn't to set out more trees, many of us, but to give better care to our trees and produce better fruit on those trees. I will simply say to those who are going into the fruit business, don't try to do too much, but grow more on a little space,—because things are changing even in the time that I can remember, and I am not so very old yet, I hope—conditions have almost entirely changed and just now those that don't understand the situation may be discouraged in going into the fruit business, with the insects and diseases that we have to contend with. But let me tell you this, don't get frightened. It is the best time for anybody who is willing to go into fruit to go into it now, understanding that he has got to grow the fruit; it won't grow itself; because those who will not take care of the fruit are going to be driven out of the business, and those that are willing to pay the price are going to get returns for their investment. Don't be afraid of the insects, the gypsy, or the brown-tail, or the San Jose scale. We were never floored yet and we never will be. When the San Jose scale first appeared in the eastern states, the fruit growers were alarmed and didn't know but what they had got to go out of the business. But as time has gone on they have found that they can control the scale. If you don't do it, you are poor and for that reason; these careless growers are going soon to be out of the business, and your markets are going to be more clear of this refuse, cheap fruit; you are going to have the markets to yourself. Fruit growing is to become a specialty.

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Prices are going to be better and you are going to make more money than you ever did before if you are only willing to put yourself into it and do the work necessary. If you are not, don't go into it, but simply let it alone.

WILFRID WHEELER, Concord, Mass.

I am very glad to be with you here tonight, and in fact at this convention, and bring you a greeting from the old Massachusetts Horticultural Society. I suppose we can claim the honor of being one of the oldest societies, if not the oldest, in the United States. At the same time, we are always ready to welcome all the new ones, and we are always ready to welcome any of the people from other societies who may come to Boston at any time. And it is always a pleasure to me to go out among the other societies of New England and find out what they are doing. The progress of this Society helps us, shows us what you are doing, shows us what you are raising in Maine. And it is only through these horticultural societies that the people get together the products of the state, or the products of the communities. They bring these products together in their annual shows and these together with the literature they publish offer great opportunities to the producers of fruit or any other agricultural or horticultural products. We represent there perhaps a very aristocratic section in a great many ways. The people about Boston who are interested largely in the Horticultural Society grow flowers. Fruits and vegetables have lately been in the background more or less, as our premium lists would show. We award perhaps three or four thousand dollars for flowers where we award two thousand for fruits and vegetables. But at the same time we are always open to exhibitions of any kinds of fruits and vegetables raised in any part of New England, or in fact in the United States. And I was very glad to notice in what your president said tonight, that it was not the money part of fruit growing or the money part of horticulture that we ought to be interested in—we ought to be interested for a love of the vocation, the avocation, and this point all New England should strive for. And if we do strive for that, and if we attain it, we will grow fruit that New England will be proud of, we will

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grow fruit that can beat all that western fruit, and certainly in quality it is far ahead of it now. We have a soil here, climatic conditions and markets that are superior to any other part of the country. We are near to the sea where apples and all our more hardy fruits can be shipped, and we are near to the markets where a large per cent of the fruit of the country is consumed. Therefore it is up to New England to prove to this country and to the world that we can grow fruit better than any other part of the country.

ROBERT H. GARDINER, Gardiner.

It has been a very great pleasure to me to be at the meeting of the Society. I have been a member of it, I believe, ever since the death of my father, but I seem to have so many irons in the fire that I never have been able to get time to attend a meeting before. I have found so much pleasure and profit in this meeting that I am going to turn over a new leaf and turn up at every meeting if possible in the future.

As I have not been a regular attendant of meetings of the Society, I want to say—and we are all here in the family so that I think we can speak pretty openly without seeming to pat ourselves too much on the back,—I have been a good deal struck with the tone of the meeting as brought out in the opening remarks of our President tonight. I have had the misfortune to have spent a good deal of my time in Boston among business men there, and there are altogether too many business men in Boston, as in every other large city who when they find a good thing try and keep it to themselves—they don't want any one else to know about it because they are afraid somebody else will share in that good thing and get some of the advantages which they are getting themselves. They won't, except when they want to borrow money at the bank, they won't admit that the business in which they are engaged is beginning to pay its expenses. I have been struck with the fact at this meeting that we all know we have got a good thing and we want everybody to know it, and, as Mr. Clark has just said, I don't think we begin yet to know how good a thing apple raising, especially in Maine, is going to be. I think, as Mr. Clark said, the half of the advantages of apple raising in Maine has not yet been told.

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I think there is going to be an enormous development in the immediate future in apple raising. We know we have a good thing and we want everybody else to know it; and we want everybody else to know it because the Society evidently thinks, and its members who have spoken evidently think it is going to be a good thing for these other people. We want other men to share the advantages which we have had. We have made a discovery, and the Society is throwing that discovery open to the world and saying to everybody here in Maine, "Now here is a good thing, you better come in to it yourself. We are doing well. We want more men to share those advantages, and you better come in and see if you won't do well at it yourself."

Then it is going to be a great thing for the young men of Maine. The young men of Maine are going to see, as a great many of them have already come to see, that there isn't any better chance for a young man than to go into fruit raising, provided he is willing to work hard and faithfully. Lots of them are going to find it better to stay east on these Maine farms and go into profitable and attractive business. They are going to find it better than to go off to the big cities, and if they succeed as well as the majority of them, pass a weary life shut up in a little bit of a hall bedroom in a dingy boarding house on a noisy side street, with hardly a glance at the sky and only a breath of pure air, and just one unending routine day after day, week after week, month after month, of some uninteresting routine business.

B. F. W. THORPE of Augusta, Editor of Maine Farmer.

It has been a more than pleasure to listen to the remarks already given by those who are much more able to give good things than the speaker. Especially have I been pleased to hear the good words expressed from those who have come to us from out of the State. I have been thinking since the President called for these remarks from me that perhaps I could do no better than for a moment to speak of something that has interested me much within the past two years, and more especially brought to my mind during the past few days. A lawyer in Illinois, who had a brilliant future before him, was told that within a very few years his sands of life would cease to flow unless he

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got out of that business out into the open air. His physician told him to come to Maine and get outside, get out into the air. He left his home, came to Maine, bought a farm—six years ago this was—knowing nothing of farming, and since that time I have learned that he is learning the business and is especially devoting his energies to fruit growing in this county. He has got into comfortable circumstances, has regained health, and is now able to follow the most arduous toil from sunrise to sunset. Now this has been more than success to him. It has been life itself.

Just adjoining him a young man came from Nova Scotia and I was talking with him only Saturday last. He came here two years ago; through the influence of the paper I represent he learned of Maine fruit growing possibilities and came to this State and found a farm adjoining the gentleman that I have just mentioned. Here he bought eighty acres of farm land and has started in there to become a fruit grower, that is, an apple grower. Beginning with a wornout orchard, or at least an orchard in poor state of growth and fruiting, he has got that now started so that he tells me that he has grown apples there this year that exceed anything he has ever seen of Baldwins in the noted Annapolis Valley which is famed for being more largely for the same area engaged in apple growing, and more successful than any other similar area in the world. He says that Maine with the same energy and the same skill can outclass that noted valley, and he has the goods to prove it with from that old orchard. His idea is to begin now and set out one hundred trees each year until he gets at least a thousand trees, and he is fully satisfied that this land—eighty acres that he paid $3,000 for—is well worth more than the land that there costs $100 an acre. That is, he said for the $3,000 farm he would have to pay at least $8,000 in that valley, and he can get better results, better market, and more successful fruit raising.

Dr. C. D. Woods, Director State Experiment Station.

There is nothing that touches the agriculture of Maine in any way, be it fruit growing or what it may be, that is not of vital interest to the Maine Agricultural Experiment Station. We

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are trying to help the agriculture of Maine as best we know how. Of course the field is large. There are many things that we are trying to do. We hope that we are going to be able in co-operation with this Society to get started in a new line of work along apple propagation, in which there are problems that need a longer life than our honored President has had to live, beyond the length of life of any one man. But we cannot do it upon any land that is under the control of the Experiment Station or the trustees of the University, because we haven't a soil or a climate that is adapted to the best fruit growing. We asked the last legislature through this Society for a farm for that purpose. In the wisdom of the legislature, or rather of the Committee on Agriculture of that legislature, that request was postponed to the next legislature. One of the things that was suggested this afternoon, you remember, was that we don't know but what the Baldwin apple could have been a hardier apple if we had confined ourselves to the old original Maine stock. That kind of a problem can never be answered upon private land. It must be where the experiment can be carried out for years under close observation. And so I would like to again state to this Society that I think that that is one of the things that we still, as producers of fruit in Maine, have a right to ask from this great State, that it shall give a laboratory—by that I mean a farm and the necessary equipment, with orchards upon which we can expend some of this money which we get from the Natioual government for the development of this fruit industry. We shall continue to do all that we can to help along the lines of fungous enemies, along the line of insect enemies; but we want to take some of these fundamental problems, that must take year after year of patient observation, and that must be under the control absolutely of the Experiment Station—I don't care about the ownership of the land, but the control of it—so that we shall know that an experiment we start today can be carried on year after year until with patience we get the answer. If we are going to solve these things, they must be solved upon land that is under control for a series of years extending, as I say, beyond the life of any one that is now connected with the Experimènt Station, I hope. I want to say that the Station is at your control, to do everything that we can in any way; if

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there are questions that you want to ask us, we will answer them if we can; we will honestly tell you when we can't. There are these questions we want to solve just as much as you want to have them solved, that we are desirous of undertaking, and we can't do it unless we can have the laboratory in the shape of a farm and things to do with.

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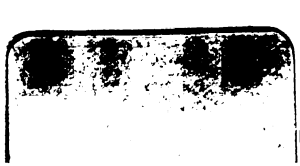
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